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A Revision of *Anemone* L. (Ranunculaceae) from the Southern Hemisphere

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The taxonomy of *Anemone* L. species distributed in the Southern Hemisphere was re-evaluated on the basis of a critical morphological analysis of the available herbarium material. A conspectus, key, detailed morphological descriptions, together with figures of flowers and fruits, and critical notes on all taxa are presented. We accept 21 *Anemone* species representing nine sections, and we confirm the validity of *A. triternata*, *A. fanninii* and *A. peruviana* which were not accepted by other authors. We interpret the morphological similarities between *A. thomsonii*, *A. caffra* and *A. fanninii*, *A. angustiloba*, *A. crassifolia*, *A. hepaticifolia* and *A. rigida* as corresponding to the section level. We describe one subsection within sect. Anemone and three series within sect. Rivularidium. Within the southern hemisphere *Anemone* group the endemic taxa dominate and all the monotypic sections are endemic. The majority of southern species are components of non-tropical floras, like the northern taxa because they are found in high montane areas. Only a few of them (viz., *A. thomsonii*, *A. angustiloba*, *A. peruviana* and *A. jamesonii*) are ultra-oreophytes (growing at elevations of 2500–4000 m); *A. decapetala* and *A. multifida* occur alt. 100–3700 m. Five species (*A. somaliensis*, *A. capensis*, *A. antucensis*, *A. assibrasiliana* and *A. moorei*) can be regarded as hot-tropical plants, being distributed alt. 300–1200 m.

Key words: *Anemone*, comparative morphology, geography, taxonomy, the Southern Hemisphere.

Anemone L. is one of the most remarkable genera of the family Ranunculaceae and including about 150 species. The genus has a worldwide distribution, with most representatives occurring mainly in the Northern Hemisphere. There are several *Anemone* species disjunctively distributed in the Southern Hemisphere, mainly in montane regions with a temperate climate.

The data on *Anemone* species are fragmented and sometimes debatable (Pritzel 1841, Hooker 1844, Ulbrich 1906, Lourteig 1951, 1956, Eichler 1958, etc.). However, the majority of the world's largest herbaria (viz., K, BM, E, P, W, WU, LE, GH, US, NY, etc.) include the herbarium specimens of these taxa, and we were lucky to examine most of these materials while visting Great

Britain, Austria, France, Russia, U. S. A., Vietnam and other countries.

Therefore, we intend to give our view on a possible differentiation and relations of the southern *Anemone* species on the basis of comparative morphology and taxonomy. We believe our interpretasion is valid because the results of the analyses of molecular data for several southern hemisphere *Anemone* species were published recently (Hoot et al. 1994, Ehrendorfer 1995, Hoot 1995, Ehrendorfer and Samuel 2001, Schuettpelz et al. 2002), and our taxonimic discussions were informed by these studies.

Literature survey

Three *Anemone* species from the floras of the Southern Hemisphere have been known since the 18th century (*A. capensis*, as *Atragene capensis*–Linne 1753, *A. decapetala*–Arduino 1764 and *A. triternata*–Vahl 1794), but most of these taxa were described in the 19th century (viz., *A. multifida*–Poiret 1816, *A. helleborifolia* and *A. tenuifolia*–Candolle 1817, *A. tenuifolia*–Sprengel 1825, *A. antucensis*–Poeppig 1833, *A. hepaticifolia*–Hooker 1836 and others). In additim, a few species (viz., *A. assibrasiliana* – Kuhl 1933, *A. angustiloba*–Eichler 1958, *A. moorei*–Espinosa 1940, *A. somaliensis*–Hepper 1971) were described in the 20th century.

In the first system of the genus *Anemone* (Candolle 1817, 1824) the southern *Anemone* species were placed in two sections (*A. decapetala*, *A tenuifolia*, *A. triternata* and *A. multifida*–sect. Anemonanthea DC., *A. capensis* and *A. helleborifolia*–sect. Pulsatilloides DC.), and in the first monograph of the genus *Anemone* (Pritzel 1841) they were included in four sections because *A. multifida* and *A. helleborifolia* were placed in sect. Anemonospermos DC. and *A. hepaticifolia* in sect. Homalocarpus DC.

In the next monograph on *Anemone* (Ulbrich 1906), 16 species were regarded as the components of the floras of the Southern Hemisphere and they were included in three sections because most of them were moved from sect. Anemonanthea to the recently described sect. Rivularidium Jancz. (Janczewski 1892) and sect. Eriocephalus Hook. f. & Thoms. (Hooker and Thomson 1855). Meanwhile four African species (*A. capensis, A. alchimillifolia* E. Mey. & Pritz., *A. fanninii* Harvey and *A. thomsonii* Oliver) were included in sect. Pulsatilloides. Ulbrich (1906) described 19 series, eight of which included the southern species. Some of these were recently part of them were the basis for the recognition of several *Anemone* sections and even subgenera (Tamura 1995).

According to the most modern interpretation of the genus *Anemone* and the family Ranunculaceae (Tamura 1991, 1995), *Anemone* species from the floras of the Southern Hemisphere (about 20) belong to five subgenera and seven sections: subgenera Anemone (sect. Anemone and Eriocephalus), Rivularidium (Jancz.) Juz. (sect. Rivularidium and Crassifolia Ulbr.), Hepaticifolia (Ulbr.) Tamura, Rigida (Ulbr.) Tamura and Pulsatilloides (DC.) Juz. (sect. Pulsatilloides, Alchimillifolia (Ulbr.) Tamura and Kilimandscharica (Ulbr.) Tamura).

Recently we re-examined the structure of the genus *Anemone* and we regard (Ziman et al. 2002) that within it there are 21 southern *Anemone* species belonging to nine sections (because at present we do not recognize any *Anemone* subgenera).

Here we present the conspectus of southern hemisphere part of the genus *Anemone* (including nine sections and 21 species), a key for determination of species, taxonomic analysis supported with detailed morphologic descriptions of all taxa, and the results of discussion of their possible relationships.

Conspectus

Anemone L., Sp. Pl. 538 (1753).

Type: *A. coronaria* L.

Sect. 1. **Anemone** sensu Tamura in Acta Phytotax. Geobot. **42**: 180 (1991).

Genus *Oriba* Adans., Fam. Pl. **2**: 459 (1763), p. p.

Sect. *Anemonanthea* DC., Syst. Nat. **1**: 212 (1817), p. p.

Sect. *Oriba* (Adans.) Spach, Hist. Nat. Veg. **7**: 250 (1839).

Sect. *Eriocephalus* Hook. f. & Thoms., Fl. Brit. Ind. **1**: 20 (1855), p. p.

Subsect. 1. **Somalienses** Ziman, Bulakh & Kadota, subsect. nov.

Type: *A. somaliensis* Hepper.

Folia radicalia palmato-tripartita; involucri phylla similia foliis folüs radicalibus; perianthii tepala persistentia, elliptico-oblanceolata, 15–30 mm longa, nervis basalbus 3–5, anastomosibus 1–2; capitula carpellorum in fructu elongata; fructus ovoidei, jugis lateralibus 0.2 mm latis, stylodiis 1–1.2 mm longis; grana pollinis 3-colpata.

Basal leaves palmately-triparted; involucral leaves similar to basal leaves; tepals persistent, elliptic-lanceolate, 10–15 mm long, basal tepal veins 3–5, with 1–2 anastomosing veins; fruiting heads elongate; achenes ovoid, styles 1.2–1.2 mm long, marginal ribs ca. 0.2 mm wide; pollen grains 3-colpate.

1. *A. somaliensis* Hepper

Subsect. 2. **Carolinianae** Starodub. in Bot. Zhurn. **74**: 1345 (1989).

Type: *A. caroliniana* Walter.

2. *A. decapetala* Arduino

3. *A. triternata* Vahl

Sect. 2. **Eriocephalus** Hook. f. & Thoms., Fl. Brit. Ind. **1**: 20 (1855).

Type: *A. rupicola* Cambess.

Sect. *Anemonanthea* DC., Syst. Nat. **1**: 212 (1817), p. p.

Sect. *Anemonospermos* DC., Syst. Nat. **1**: 212 (1817), p. p.

Sect. *Diplocalymnata* Speng., Syst. Veg. **2**: 660 (1825), p. p.

Subsect. *Longistylae* Ulbr. in Bot. Jahrb. **36**: 204 (1905), p. p.

Ser. 1. **Multifidae** Ulbr. in Bot. Jahrb. **36**: 205 (1906) – Subsect. *Multifidae* (Ulbr.) Starodub., Vetrenytsy: 120 (1991).

Type: *A. multifida* Poir.

4. *A. multifida* Poir.

Sect. 3. **Kilimandscharica** (Ulbr.) Tamura in Acta Phytotax. Geobot. **42**: 180 (1991)–Ser. *Kilimandscharicae* Ulbr. in Bot. Jahrb. **36**: 201 (1906).

Type: *A. thomsonii* Oliver.

Subgenus *Pulsatilloides* (DC.) Juz., Fl. URSS **7**: 256 (1937).

5. *A. thomsonii* Oliver

Sect. 4. **Pulsatilloides** DC., Syst. Nat. **1**: 195 (1817), p. p. – Subgenus *Pulsatilloides* (DC.) Juz., Fl. URSS **7**: 256 (1937), p. p. – Genus *Pulsatilloides* (DC.) Starodub., Vetrenytsy: 124 (1991), p. p.

Type: *A. capensis* (L.) DC.

Subsect. *Longistylae* Ulbr. in Bot. Jahrb. **36**: 200 (1906), p. p.

Ser. *Pinnatifoliae* Ulbr. in Bot. Jahrb. **36**: 200 (1906).

6. *A. capensis* L.

Sect. 5. **Alchimillifolia** (Ulbr.) Tamura in Acta Phytotax. Geobot. **42**: 179 (1991)–Ser. *Alchimillifolia* Ulbr. in Bot. Jahrb. **36**: 200 (1906), p. p.

Type: *A. caffra* (Ecklon & Zeyher) Harvey.

7. *A. caffra* (Ecklon & Zeyher) Harvey

8. *A. fanninii* Harvey

Sect. 6. **Rivularidium** Jancz. in Rev. Gen. Bot. **4**: 251 (1892) – Subgenus *Rivularidium* (Jancz.) Juz., Fl. URSS **7**: 255 (1937) – Subgenus *Rivularidium* sensu Starodub., Vetrenytsy: 119 (1991), p. p.

Type: *A. rivularis* Buch.- Ham. ex DC.

Genus *Anemonidium* (Spach) Holub in Folia Geobot. Phytotax. Praha **9**: 272 (1974), p. p.

Subgenus *Meridium* Starodub., Vetrenytsy: 118 (1989), p. p.

Sect. *Anemonospermos* DC., Syst. Nat. **1**: 195 (1817), p. p.

Sect. *Diplocalymnata* Spreng., Syst. Veg. **2**: 660 (1825), p. p.

Ser. *Rivulares* Ulbr. in Bot. Jahrb. **36**: 197 (1906), excl. p.

Ser. 1. **Angustilobae** Ziman, Bulakh & Kadota, ser. nov.

Type: *A. angustiloba* H. Eichler.

Caudicis ramosi, radicis primariae, caulisis monopodiale. Tepala 5–7, 10–15 mm longa, pubescentia. Inflorescentiae pauciflore, simplici. Petioli foliorum basalium basaliter abrupte dilatati (auriculiforme), laminae foliorum basalium ternatae.

Plants with branched caudices, tap-roots and monopodial scapes.Tepals 5–7, 10–15 mm long, pubescent. Inflorescences few-flowered, simple. Basal leaf petioles basally sharply dilated (auriculate), basal leaf blades ternate.

9. *A.angustiloba* H. Eichler

10. *A. sumatrana* de Vriese

Ser. 2. **Mexicanae** (Starodub.) Ziman, Bulakh & Kadota, comb. nov. – Sect. *Mexicanae* Starodub., Vetrenytsy: 119 (1989).

Type: *A. mexicana* Humb., Bonpl. & Kunth.

Plants with branched caudices, tap-roots and sympodial scapes. Tepals 4(–5), 6–15 mm long, white-yellowish, glabrous. Inflorescences many-flowered, compound. Basal leaf petioles basally sharply dilated (auriculate), basal leaf blades palmatifid with pinnatisect leaflets.

Subsect. *Helleborifolia* Starodub., Vetrenytsy: 119 (1989) – Ser. *Helleborifolia* Tamura in Acta Phytotax. Geobot. **42**: 178 (1991), ut '*Helleborifoliae*'.

11. *A. helleborifolia* DC.

12. *A. peruviana* Britton

Ser. 3. **Jamesonii** Ziman, Bulakh & Kadota, ser. nov.

Type: *A. jamesonii* Hook. f.

Planta rhizomate, radicis adventitiae, caulisis sympodiale. Tepala 5–15, 10–35 mm longa, rubra vel rubida, pubescentia vel glabra. Inflorescentiae pauciflore, simplici. Petioli foliorum basalium basaliter abrupte dilatati vel vaginati, laminae foliorum basalium ternatae, folioli.2–3-lobata vel partita.

Plants with rhizomes, adventitious roots and sympodial scapes.Tepals 5–15, 10–35 mm long, red or reddish, pubescent or subglabrous. Inflorescences few-flowered, simple. Basal leaf petioles basally widely dilated or vaginate, basal leaf blades ternate, with 2–3-lobed or parted leaflets.

13. *A. jamesonii* Hook. f.

14. *A. sellowii* Pritzel

15. *A. assibrasiliana* Kuhl. & Porto

16. *A. moorei* Espinosa

17. *A. antucensis* Poeppig

18. *A.tenuicaulis* (Cheeseman) Parkin & Sledge

Sect. 7. **Crassifolia** (Ulbr.) Tamura in Acta Phytotax. Geobot. **42**: 178 (1991) – Ser. *Crassifolia* Ulbr. in Bot. Jahrb. **36**: 199 (1906).

Type: *A. crassifolia* Hook. f.

19. *A .crassifolia* Hook. f.

Sect. 8. **Hepaticifolia** sensu Tamura in Sci. Rep. Osaka Univ. (16): 28 (1967) – Ser. *Hepaticifolia* Ulbr. in Bot. Jahrb. **36**: 197 (1906) – Subgenus *Hepaticifolia* (Ulbr.) Tamura in Acta Phytotax. Geobot. **42**: 178 (1991) – Genus *Anemonidium* subgen. *Meridium* Starod. sect. *Meridium* subsect. *Hepaticifolia* (Ulbr.) Starodub., Vetrenytsy: 118 (1991).

Type: *A. hepaticifolia* Hook. f.

Sect. *Rivularidium* Jancz. in Rev. Gen. Bot. **4**: 251 (1892), p. p.

20. *A. hepaticifolia* Hook. f.

9. Sect. **Rigida** (Ulbr.) Tamura in Sci. Rep. Osaka Univ. (16): 28 (1967) – Ser. *Rigida* Ulbr. in Bot. Jahrb. **36**: 199 (1906) – Subgenus *Rigida* (Ulbr.) Tamura in Acta Phytotax. Geobot. **42**: 178 (1991) – Genus

Anemonidium subgen. *Meridium* Starodub. sect. *Meridium* subsect. *Rigida* (Ulbr.) Starodub., Vetrenytsy: 119 (1991).

Type: *A. rigida* Gay.

Sect. *Rivularidium* Jancz. in Rev. Gen. Bot. **4**: 251 (1892), p. p.

21. *A. rigida* Gay

Key to species of *Anemone* from the Southern Hemisphere

1a. Carpels and achenes more or less densely pubescent, symmetrical, mainly ovoid, sharply narrowed into substraight styles ... 2

1b. Carpels and achenes glabrous or subglabrous, mainly assymetrical, oblong-ovoid, gradually narowed into curved or hooked styles 9

2a. Carpels and achenes with dense hairs, mainly longer than the bodies; tepals monomorphic, densely pubescent; above-ground shoots sympodial or monopodial 3

2b. Carpels and achenes covered with hairs shorter than the bodies; tepals monomorphic or dimorphic, pubescent or glabrous; above-ground shoots sympodial 6

3a. Carpels and achenes ovoid-globose; tepals 10–18, deciduous or persistent; above-ground shoots sympodial; plants with tuberous rhizomes and adventitious roots (sect. Anemone) 4

3b. Carpels and achenes subellipsoid; tepals 6–10, persistent; above-ground shoots monopodial; plants without tuberous rhizomes but having branched caudices and tap-roots (sect. Eriocephalus) ..... 4. *A.multifida*

4a. Tepals elliptic-obovate, glabrous; carpels and achenes ovoid and not compressed; carpel and achene styles 1–2 mm long, achene hairs 3–3.5 mm long; basal leaves palmately 3-parted (subsect. Somaliense) .... 1. *A. somaliensis*

4b. Tepals linear-oblong or lanceolate, densely pubescent; carpels and achenes subglobose, distinctly compressed and with visible lateral ribs; carpel and achene styles 0.5–1.0 mm long, achene hairs 4–5 mm long; basal leaves 1–2-ternate (subsect. Carolinianae) 5

5a. Tepals deciduous, 8–20 × 2–5 mm, with 5–7 basal veins and 1–2 anastomosing veins; filaments linear; inflorescences few-flowered; basal and involucral leaves dissimilar, basal leaves dimorphic .... 2. *A. decapetala*

5b. Tepals persistent, 10–15 × 2–3 mm, with 3 basal veins and without anastomosing veins; filaments filiform; flowers solitary; basal and involucral leaves similar, basal leaves monomorphic ..... 3. *A. triternata*

6a. Carpels and achenes distinctly stalked, cylindroid, covered with hairs 3–4 mm long; styles 1–2 mm long; stigmas capitate; tepals having few anastomosing veins, sparsely pubescent; basal leaf petioles basally sharply dilated (auriculate), basal leaf blades glabrous; plants with short rhizomes and adventitious roots (sect. Kilimandscharica) .... 5. *A. thomsonii*

6b. Carpels and achenes sessile, spindle-like or oblong-ovoid, covered with hairs 2–3 mm long; styles 6–10 mm long; stigmas linear; tepals having more than 5 (sometimes more than 10) anastomosing veins, densely pubescent; basal leaf petioles basally slightly dilated, basal leaf blades pubescent; plants with caudices and tap-roots 7

7a. Carpels and achenes spindle-like; tepals 15–25, 25–50 mm long, linear-lanceolate, densely pubescent, having 3–9 anastomosing veins; leaves 3-ternate, subglabrous; non-rosetteous semi-shrubs (sect. Pulsatilloides) ..... 6. *A. capensis*

7b. Carpels and achenes oblong-ovoid; tepals 10–12, 20–40 mm long, wide-lanceolate, sparsely pubescent, having more than 10 anastomosing veins; basal leaves palmately lobed, villous; semirosetteous herbaceous plants (sect. Alchimillifolia) 8

8a. Carpels and achenes 4–5 mm long, covered with dimorphic hairs 1–5 mm long; tepals monomorphic; filaments distinctly

dilated; basal leaf blades 5–7 cm wide .... 7. *A. caffra*
8b. Carpels and achenes 5–10 mm long, covered with monomorphic hairs 3–6 mm long; tepals dimorphic; filaments slightly dilated; basal leaf blades 12–20 cm wide .... 8. *A. fanninii*
9a. Carpels and achenes oblong-ovoid (rarely subcylindroid), mainly 3–7 mm long; tepals (5–)6–15 (Sect. Rivularidium) 10
9b. Carpels and achenes shortly-ovoid or cylindroid, 2–4(–5) mm long; tepals (4–)5–7 19
10a. Tepals 5–7, white or pinkish, pubescent; basal leaf petioles basally sharply dilated, basal leaf blades ternate; plants with caudices, tap-roots and monopodial scapes 11
10b. Tepals 5–15, red or yellowish, subglabrous; basal leaves various; plants various underground shoots and roots but with sympodial scapes 12
11a. Tepals 5–7, 15–20 mm long, white, with 3–5 anastomosing veins; cymes 1–2-flowered; achene styles uncinate, 1–1.5 mm long ..... 9. *A. angustiloba*
11b. Tepals 5, 10–15 mm long, pinkish, with 7–9 anastomosing veins; cymes 3–5-flowered; achene styles hooked, 0.3–0.5 mm long ..... 10. *A. sumatrana*
12a. Tepals 4(–5), 6–15 mm long, white-yellowish, with solitary anastomosing veins, glabrous; inflorescences many-flowered, compound; leaflets of basal leaf blades pinnatisect, glabrous; plants with caudices, tap-roots and widely dilated bases of basal leaf petioles (Ser. Mexicanae) 13
12b. Tepals 5–15, 10–35 mm long, mainly red or reddish, having or not having anastomosing veins, pubescent or subglabrous; inflorescences mainly few-flowered, simple; leaflets of basal leaf blades 2–3-lobed or parted, sparsely puberulent; plants with rhizomes, adventitious roots and widely dilated or vaginate bases of basal leaf petioles (ser. Jamesonii) 14
13a. Tepals 6–12 mm long, yellowish, achene styles basally curved, 2–3 mm long; basal leaf blades 8–15 × 12–18 cm, bract petioles wide, 3–5 mm long .... 11. *A. helleborifolia*
13b. Tepals 12–15 mm long, white; achene styles apically uncinate, 1–2 mm long; basal leaf blades 6–9 × 7–15 cm, bract petioles narrow, 1–3 mm long ..... 12. *A. peruviana*
14a. Tepals with narrow bases and wide apices, anastomosing veins absent; basal leaf petioles basally sharply dilated 15
14b. Tepals with narrow bases and apices, having or not having vein anastomose; basal leaf petioles basally vaginate 17
15a. Tepals 5, 8–12 mm long, monomorphic, sparsely puberulent along central vein; carpels and achenes 2–4 mm long, with styles ca. 1 mm long; cymes 2–3-flowered; basal leaf blades 2- or 3-ternate, not coriaceous; bracts shortly petiolate, biternate ..... 13. *A. jamesonii*
15b. Tepals 8–16, 15–35 mm long, dimorphic, glabrous or subglabrous; carpels and achenes 3–9 mm long, with syles 2–6 mm long; cymes 1–2-flowered; basal leaf blades ternate, coriaceous, bracts sessile, entire (distally dentate) 16
16a. Achenes 6–9 mm long, with styles 4–6 mm long; basal leaflets 2–3-parted (lobed) ..... 14. *A. sellowii*
16b. Achenes 3–5 mm long, with styles 2–3 mm long; basal leaflets entire .... 15. *A. assibrasiliana*
17a. Tepals 20–35 mm long, with 5–7 anastomosing veins, sparsely pubescent along central vein; carpels and achenes not compressed, basally sparsely pubescent; styles substraight; basal leaf blades 15–35 cm long, glabrous ..... 16. *A. moorei*
17b. Tepals 4–15 mm long, without anastomosing veins, subglabrous; carpels and achenes compressed, having lateral ribs, glabrous; styles curved; basal leaf blades 3–8 cm long, sparsely pubescent 18
18a. Tepals 7–15 mm long, elliptic, pinkish-

white; achenes shortly stalked; styles 3–5 mm long; inflorescences 2–3-flowered; basal leaf blades 3-parted or 3-lobed; plants with short rhizomes ..... 17. *A. antucensis*
18b. Tepals 4–6 mm long, linear–lanceolate, red; achenes sessile; styles 1–2 mm long; flowers solitary; basal leaf blades ternate or biternate; plants with short nodulose and long stolon-like rhizomes .... 18. *A. tenuicaulis*
19a. Achenes 2–3 mm long; tepals 12–18 mm long, with 3–5 anastomosing veins; flowers solitary; plants with tuberous and stolon-like rhizomes (sect. Crassifolia) .... 19. *A. crassifolia*
19b. Achenes 4–5 mm long; tepals 15–35 mm long, with more than 10 anastomosing veins or without them; inflorescences compound, many-flowered; plants without tuberous and stolon-like rhizomes 20
20a. Tepals pinkish-white, without anastomosing veins, sparsely pubescent; anther connectives wide, with projections; basal leaf petioles basally sharply dilated and their blades 3–5-lobed; plants with short rhizomes and adventitious roots (sect. Hepaticifolia) ..... 20. *A. hepaticifolia*
20b. Tepals red, with more than 10 anastomosing veins, glabrous; anther connectives narrow, without projections; basal leaf petioles basally vaginate and their blades 3–5-parted; plants with caudices and taproots (sect. Rigida) ..... 21. *A. rigida*

1. **Anemone somaliensis** Hepper in Kew Bull. **26**: 57 (1971). **Type**: N. Africa. SOMALIA. South of Al Hillas, stony ground in shade, 3000 ft., 10.11.1929, C. Barrington Brown in Herb. Collenette 413 (holotype–K!).

Rhizomes tuberous, stout and irregular, ca.15 × 12 mm, non-branched. Basal leaves 2–3; petioles 5–15 cm long, subglabrous or sparsely pubescent; blades monomorphic, palmately 3-parted, 3–7 × 5–10 cm, with sessile crenate-dentate primary segments and 30–40 obtuse ultimate lobules, glabrous (Fig. 1a). Scapes 7–18 cm long, 1–2-flowered (lateral flower frequently under-developed), appressed-pubescent. Involucral leaves 3 (–4), sessile, basally connate, similar to basal leaves, blades 2–3-parted or lobed, with 10–15 obtuse ultimate lobules or teeth, 1.5–2.5 cm long, subglabrous. Pedicels 2–4 cm long, densely pubescent under flowers. Tepals 10–18, persistent, monomorphic, elliptic-obovate, with wide bases and obtuse dentate apices, blue or mauve, 10–15 × 3–5 mm, with 3–5 basal veins and few anastomoses, glabrous. Stamens 3–4 mm long, with linear filaments, ellipsoid anthers and narrow connectives. Carpels ovoid, not compressed, ca. 1 mm long, densely covered with hairs 3–3.5 mm long, styles straight, 1–2 mm long; stigmas linear. Fruiting heads elongate. Achenes ovoid, 1.6–2.0 × 1–1.2 mm, lanate, marginal ribs ca. 0.2 mm wide; hairs 3–3.5 mm long; styles straight, 1–2 mm long, stigmas linear (Fig. 2a).

Chromosome number: unknown.

Pollen grains: tricolpate (present paper: voucher specimen Thulin & Warfa s. n., UPS-K).

Distribution and habitat: E. Africa, Somalia, narrow endemic of Al Medo Hills; in stony ground or limestones, together with species of *Buxus, Olea, Dodonaea* and others in evergreen bushes, alt. 920–1200 m.

Specimens examined: **SOMALIA**. In midst belt of N facing limestone, escarpment with considerable winter rainfall from NE Monsoon. Evergreen, bushland with *Acokanthera, Buxus, Dodonaea, Olea africana*. N. of Galgallo, 11°01′N, 49°02′E, 1300 m, 7.12.1969. Lavranos 7300 (K); Bari, Escarment, S of Bunder Murraya, Buraha Dhasi, 11°38–39′N, 50°29–32′E, 1050 m, 16–17.11.1986, Thulin & Warfa s. n. (UPS-K).

Note: The collector of the type specimen Barrington Brown believed this plant was *A. blanda*, but Hepper (1971) after his re-examination determined this plant as a new species (*A. somaliensis*) which he regarded as taxonomically close to *A. hortensis* but

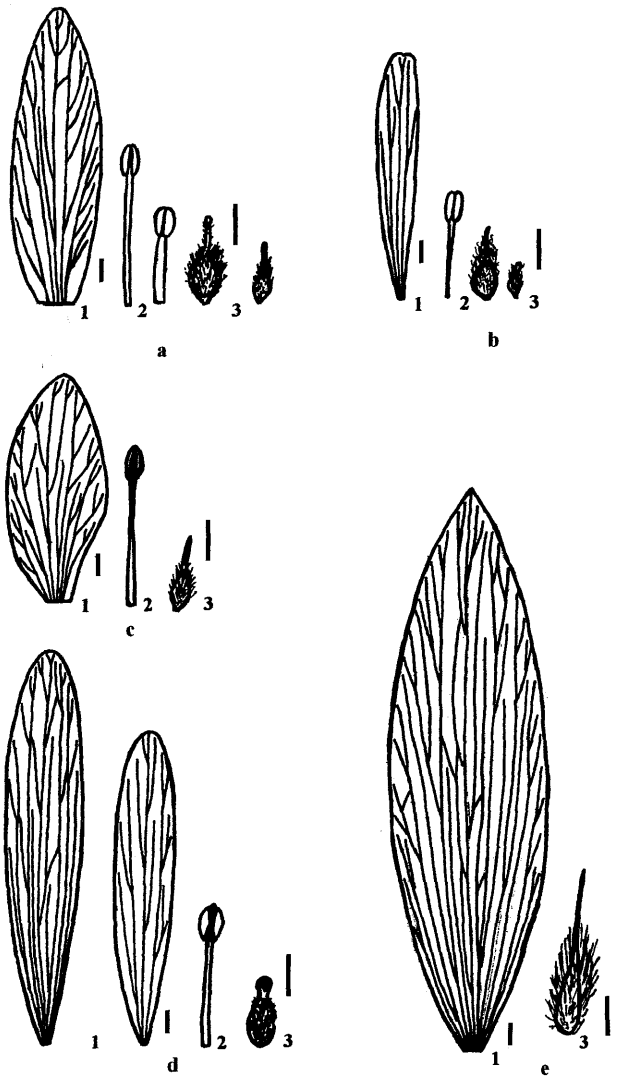

Fig. 1. Flowers of *Anemone* species from the Southern Hemisphere. a. *A. decapetala* (Argentina. Tucuman Tabi, 10.5.1950, Rocha 2902, LE). b. *A. triternata* (Bolivia. Meguel Bang Lectae ex Herb. Collegii Columbix, 1891, Britton & Rusby 1041, LE). c. *A. multifida* (Argentina. Estancia Harberton, Brown Chico, 7.1.1967, Goodale 468, MHA). d. *A. thomsonii* (Sudan. Mts. Matong, 12.2.1936, Jihnston 1512, K). e. *A. capensis* (South Africa. Cape Distr., 7.1890, Gamble 22096, K). 1: Petal. 2: Stamen. 3: Carpel. Scale indicates 1 mm.

differing from it by much larger involucral leaves (similar to basal ones) and smaller perianth. Thulin (1993), who included *A. somaliensis* in "Flora of Somalia", also regarded it as a taxon close to *A. hortensis* but differing by its stout rhizomes, sparsely pubescent or subglabrous basal leaf petioles, tall stems (to 20 cm long) appressed-

pubescent distally, 3–4 involucral leaves, partially united basally and sparsely pubescent, and pedicels 2–4 cm long, densely pubescent in the upper part, flowers with 10–18 blue or mauve tepals 10–15 mm long, obtusely emarginate or variously divided at the apex, and pilose carpels with erect styles.

According to the results of our re-examination of the type specimens of *A. somaliensis* in K (Barrington Brown 413), we confirmed most characters noted by Thulin but we regard that the characters in common with *A. hortensis* are few (few tepals and elongate achene heads) but the characters in common with *A. tschernjaewii* Regel and *A. serawschanica* Kom. from the flora of Central Asia are more numerous (tuber shape, basal leaf petioles basally not dilated, not connate basal part of involucral leaf petioles similar to those in basal leaves, and tepals having solitary anastomosing veins). The most significant phenomenon is the tricolpate pollen grains of *A. somaliensis* which we studied firstly for this species (from Thulin & Warfa, UPS-K) characteristic for subsect. Carolinianae and absent in both subsect. Anemone and Biflora Therefore, we note *A. somaliensis* stands apart from the both Mediterranean subsect. Anemone and Central Asian subsect. Biflora and we separate it into the monotypic subsection Somaliense, subsect. nov.

2. **Anemone decapetala** Arduino, Animadv. Bot. Spec. Alt. **2**: 27 (1764). **Type**: N.710-21 (lectotype–LINN!). De semillas procedentes de Brasil (paratype–P!).

A. trilobata Juss. in Ann. Mus. Hist. Nat. Paris **3**: 248 (1804).

A. sphenophylla Poepp., Fragm. Syn. Pl.: 27 (1833).

A. chilensis Spreng. ex Pritz. in Linnaea **15**: 626 (1841), nom. nud.

A. macrorrhiza Domb., Fl. Bras. **13**: 151 (1864).

A. bilobata Phil., Cat. Plants Vasc. Chile 5 (1881).

A. polypetala Larranaga in Escritos **2**: 178 (1922).

Rhizomes tuberous, ovoid-cylindroid, 1.7–2.5 × 1.2–1.8 cm. Basal leaves 3–5, petioles 2–10 cm long, scarcely pubescent, with gradually dilated scale-like bases (6–8 mm wide); blades dimorphic, 2-ternate, 1–2 × 1–7 mm, scarcely pubescent. Early basal leaves with 10–15 broadly ovate obtuse ultimate divisions; primary segments subsessile or on petiolules 2–3 mm long; later basal leaves with 40–60 linear-oblong wide-obtuse ultimate lobules; primary segments on petiolules 5–20 mm long (Fig. 2a). Fruiting plants sometimes lacking basal leaves. Scapes 5–35 cm long, few-flowered, scarcely puberulent. Involucral leaves 3, on petioles 2–5 × 3–5 mm; blades 1-ternate, dissimilar to the basal ones, 2–10 cm long, scarcely puberulent; blades 1-ternate; primary segments with 20–30 linear-oblong long-acute ultimate lobules. Lateral flowers with two small linear bracteoles. Pedicels 5–25 cm long, scarcely puberulent. Tepals 10–12, deciduous, linear-oblong, blue or whitish-pink, monomorphic, 8–20 × 2–5 mm, with (3–)5–7 basal veins and 1–2 anastomosing veins, densely pubescent. Stamens 3–5 mm long, with linear filaments, globose anthers and narrow connectives. Carpels subglobose, slightly compressed (marginal ribs ca. 0.2 mm wide), 1–2 mm long, densely covered with hairs 0.7–1 mm long; styles curved, 0.5–0.7 mm long; stigmas linear (Fig. 1a). Fruiting heads elongate-cylindroid, 2.0–2.5 × 1.5–2.0 cm. Achenes subglobose, with ribs 0.3–0.6 mm wide, 1.5–2.5 × 1.3–1.8 mm; densely pubescent (hairs 4.5–5.7 mm long); styles substright or subulate, 0.7–1.2 mm long, stigmas linear (Fig. 2b).

Chromosome number: n = 8, 12 (Joseph and Heimburger 1966, Rothfels et al. 1966, Baumberger 1970).

Pollen grains: pantocolpate (Huynh 1970).

Distribution and habitat: mainly eastern part of extratropical South America (Argentina, Brazil, Chile, Peru, Uruguay); on rocky slopes, gravelly soil and shaded places, alt. 100–3000 m.

Specimens examined: **ARGENTINA**. San Martin de los Andes, 3000 m, 3.11.1926, Comber 725 (K); Tucuman: Estancia Santa Maria, 30.8.1949, Pederson 412 (K); San Javier 10.2.1950, Rocha (WU); Empedrado: Corientes, 22.8.1971, Pederson s. n. (GH); Sierra de la Venlana, Cerro Ventruz, 28.9.1981, Roig 47037, (K); Magellan, Cape Negro, Cape Darwin, without date, Hemslow s. n. (K). **CHILE**. Conception, Macrae, 10.1825, Bridges s. n. (K); Valparaiso, 1831, Cuming s. n. (K); Valparaiso, 1832, Bridges (K); 1856, Harvey (K); Santiago, 2.1856 (KW); Valparaiso, Durren Ebenen, 5.8.1895, Buchtien s. n. (E); Valparaiso, Quintero, 9.1923, Wenderman s. n. (E); San Martin de los Andes, 3000 m, 3.11.1926, Comber 725 (K); Colchagua: San Fernando, Cerro Nicunlanta, 9.1928, Montero 732 (K); Prov. Coquimbo, Dept. Illapel, La Vega Escondida, 3450 m, 20.12.1938, Morrison s. n. (K); Alto del Puerto, 18.8.1940, Santesson s. n. (K). **URUGUAY**. Montevideo: Cerro Cassabo, 9.1926, Herter s. n. (GH).

Note: This species was described from the flora of Chile in 1764 by Arduino, and it was included in early works (e. g., Linnaeus 1753, Candolle 1817, Pritzel 1841), as well as more recent papers (e. g., Britton 1892 and Lourteig 1951). In Linnaeus' *Species Plantarum* of 1753, this species was still absent, but we have examined in LINN the lectotype specimen which was the basis for the Arduino description.

It is the rather polymorphic species within which several narrow or segregate species were described (viz., *A. trilobata*, *A. polypetala*, etc.). However, we note that all specimens referred to this taxon which we examined in K, BM, GH and other herbaria have several common differential characters: ovoid-cylindroid tubers, 1–2-ternate basal and 1-ternate involucral leaves (latter ones dissimilar to former leaves), presence of two small bracteoles), few-flowered scapes, 10–12 deciduous, monomorphic, linear-oblong, blue or whitish-pink tepals having 5–9 basal veins with 1–2 anastomosing veins (character unique within the tuberous species of *Anemone* in the New World), and subglobose achenes with mainly subulate styles densely covered with hairs 4.5–5.7 mm long.

Meanwhile, we have to note that the data for our comparative-morphological study were rather limited and its results are not sufficient base for elaboration of the interspecific structure of the polymorphic taxon *A. decapetala*.

3. **Anemone triternata** Vahl in Symb. Bot. **3**: 74 (1794). **Type**: URUGUAY. Circa Monte-Video ad ostium fluminis Plata, Commerson, no date nor herbarium locality.

A. tridentata Vahl in Symb. Bot. **3**: 75 (1794).

A. fumariefolia Juss. in Ann. Mus. Hist. Nat. Paris **3**: 247 (1804).

A. decapetala Arduino var. *foliolosa* H. Eichler, Fl. Brasil. **13**: 151 (1864).

A. cicutifolia I. M. Johnst. in J. Arn. Arbor. **19**: 248 (1938).

Rhizomes tuberous, elongate-cylindric, 1.5–2.5 × 0.7–1.0 cm. Basal leaves 2–5, petioles 3–13 cm long; expanded basally, glabrous; blades 1–2-ternate, monomorphic, 2–5 × 2–5 cm; primary segments with long, narrow-linear acute ultimate lobules, scarcely pubescent; petiolules 10–25 mm long. Scapes 10–20 cm long, 1-flowered, scarcely pubescent. Involucral leaves similar to basal ones, 1–2-ternate, blades 5–8 cm long, with petiole-like bases; ultimate lobules linear, acute, scarcely pubescent (Fig. 1b). Pedicels 5–25 cm long, densely pubescent. Tepals 10–15, persistent, monomorphic, lanceolate, apically acuminate, white to pink, 10–15 × 2–3 mm, with 3 basal veins and without anastomosing veins, densely pubescent only basally. Stamens 5–6 mm long, with filiform filaments, ellipsoid anthers and narrow connectives. Carpels subglobose, slightly compressed (ribs 0.2–0.3 mm wide), ca. 1 mm long, densely cov-

ered with hairs ca. 1 mm long, styles curved, less than 1 mm long, stigmas linear (Fig. 1b). Fruiting heads elongate, 2.0–2.5 × 0.5–1.0 mm. Achenes subglobose, compressed, 1.5–2.2 × 1.5–2.0 mm, marginal ribs 0.4–0.6 mm long, densely covered with hairs 4–4.5 mm long; styles curved, 0.4–0.6 mm long, basally pubescent, stigmas linear (Fig. 2c).

Chromosome number: n = 8 (Joseph and Heimburger 1966, Baumberger 1970, Rothfels et al. 1977).

Pollen grains: pantocolpate (Huynh 1970a).

Distribution and habitat: South America (Argentina, Bolivia, Brazil, Chile, and Uruguay); in high mountains, alt. 1300–3500 m.

Specimens examined: **ARGENTINA**. Prov. de Buenos Aires: El Soccoro, 8.11.1926, Parodi s. n. (K); Las Palmas, 13.10.1946, Hunzinker 1686 (K); 14.10.1946, Krapovickas 3088 (K); Prov. de Tucuman, Dept. Burroyaco, Cerro del Campo, 2000 m, 15.12.1928, Venturi 1116 (K); Prov. de Salta: Dept. Guachipas, Alemania, 1300 m, 3.12.1929, Venturi 9846 (K); Dept. Empedrado: Prov. Corrientes, Dept. Bella Vista, 10 km S of de Bella Vista, cause seco de Toropi, 13.9.1972, Schimini 5294 (K); Estancia Las Tres Marias, 22.08.1975, Pederson 10723 (K). **BOLIVIA**. Bolivian Plateau, 1891, Britton & Rusby s. n. (LE); 22.6.1892, Britton 1041 (K); Larecaja: Lorato, Mts. Munayapata, Challasuyo, 1800 ft., 1.1898, Mandon s. n. (K); Toldos bei Bermejo, 9.12.1903, Filbrig 2375 (K); Rio Grande do Sul, 247 (W). **BRAZIL**. Parana: Gallinhas, Mun. Gal. Carneiro, 27.10.1969, Hatschbach 22721 (K). **CHILE**. La Banca, 10.1.1864, Pearce (K); Valparaiso, Durren Ebenen, 5.8.1895, Buchtien s. n. (E); Valparaiso, Quinterj, 20 m, 9.1923, Wendermann s. n. (E). **PERU.** Dept. Cuzco, 13000 ft., 12.1933, Stafford 213 (K); Cusco, Santa Rosa, 13500 ft., 13.2.1937, Stafford 516 (K). **URUGUAY.** Dept. de Montevideo, Cerro, 100 m, 8.1925, Herter 78854 (K); Concepcion, 7.1877, Lorentz s. n. (K).

Note: Within segregate tuberous species in the flora of South America, Lourteig (1951) regarded three of them (*A. triternata* Vahl, *A. fumariaefolia* Juss. and *A. cicutifolia* Johnst.) as *A. decapetala* Arduino var. *foliolosa* H. Eichler and argued that these plants differ from var. *decapetala* by the long-petiolate (3–13 cm) basal leaves with 3-pinnate blades having obovate-cuneate terminal lobes and pinnatifid involucral leaves.

According to our data, the distinctions of these plants from those of *A. decapetala* are more essential because they have solitary flowers, petiole-like bases of involucral leaves, and especially persistent basally pubescent tepals with three basal veins and very short achene styles (no more than 0.4–0.6 mm long) which are unique within the tuberous species of the New World. Therefore, we regard these plants merit species (not variety) status. The priority name is *A. triternata* described in 1794. In the protologue of *A. triternata* the type specimen "Uruguay circa Monte-Video ad ostium fluminis Plata, Commerson", without date, is noted, but Lourteig (1951) mentioned as a type of *A. decapetala* Ard. var. *foliolosa* H. Eichler "Brasil, Sellow, without date (K)". We consider the forementioned var. *foliolosa* a synonym of *A. triternata.*

4. **Anemone multifida** Poir. in Lamarck, Encycl. Meth. Suppl. **1**: 364 (1817). **Type**: Herb. Poiret. Chile, Magellanes, Patagone, 1764, Commerson (holotype–P!).

A. multifida DC., Syst. Nat. **1**: 209 (1817).

A. multifida Poir. var. *hudsoniana* DC., Syst. Nat. **1**: 209 (1817).

A. multifida Poir. var. *magellanica* DC., Syst. Nat. **1**: 209 (1817).

A. multifida Poir. var. *uniflora* DC., Syst. Nat. **1**: 209 (1817).

A. multifida var. *globosa* Nutt. ex Torrey & Gray, Fl. N. Amer. **1**: 13 (1838).

A. multifida Poir. var. *grandiflora* Eichler, Fl. Brasil. **13**: 151 (1864). Type: Argentina. S Patagonia, Mt. Burmeister, 1900, Prichard (BM!).

A. multifida Poir. var. *commersoniana* (Richards.) Ulbr. in Bot. Jahrb. **36**: 203 (1906).

A. multifida Poir. var. *lanigera* (Gay) Ulbr. in Bot. Jahrb. **36**: 259 (1906).

A. mltifida Poir. var. *richardsiana* Fern. in Rhodora **19**: 41 (1917).

A. multifida Poir. var. *sansonii* Boivin in Provanchera **6**: 584 (1966).

A. commersoniana DC. ex Deless, Icon. **1**: 4 (1820).

A. hudsoniana Richards., Frankl. J. Ed. **2**: 22 (1823).

A. lithophila Rydberg in Torrey Bot. Club Bull. **29**: 152 (1902).

A. stylosa Nelson in Bot. Gaz. **42**: 52 (1906).

A. baldensis Hook. f., Fl. Bor. Am. **1**: 15 (1830).

A. globosa Nutt. ex Pritz. in Linneana **15**: 112 (1841).

A. sanguinea Pursh ex Pritz. in Linneana **15**: 112 (1841).

A. lanigera Gay in Hist. Chile. Bot. **1**: 22 (1845).

A. tetonensis Port. ex Britton in Ann. N. Y. Acad. Sci. **6**: 222 (1892).

Caudices vertical or somewhat ascending, branched, 3–10 cm × 10–15 mm, tap-roots (woody rootstocks) present. Basal leaves 5–7(–10); petioles basally vaginate, 3–10(–15) cm long, pilose or pubescent; blades 3-ternate to biternate, pentagonal-rhombic, 2–6 × 2–8 cm, pilose; bases crenate to cordate, apices broadly acute or subobtuse; margins incised; ultimate lobules linear to lanceolate, 1.5–3 cm wide; central leaflets rhombic to obovate, 3-parted or 3-lobed, on petiolules 2–5(–10) mm long; lateral leaflets similar to central ones but sessile or subsessile. Scapes axillary (above-ground shoots monopodial), 10–30(–70) cm long, pilose, cymes (1–)3–5-flowered. Bracts 3–6, subsessile or on petioles 1–3 mm long; blades 3-parted to 3-lobed, hispid to villous. Bracteoles present, small, sessile, 3-parted, villous. Pedicels 5–30 cm long, villous. Tepals 5–6(–10), persistent, monomorphic, oblong-ovate, with acuminate bases and apices, blue to reddish or yellowish, 8–15 × 3–8 mm, densely pubescent outside and hairy inside, basal veins 3–5, anastomosing veins absent (rarely solitary). Stamens 3–5 mm long with linear filaments, basally slightly dilated, ellipsoid anthers and wide connectives. Carpels ovoid, narrowed basally and apically, ca. 1 mm long, densely covered with hairs 1–2 mm long; styles substraight, ca. 1 mm long; stigmas linear (Fig. 1c). Fruiting heads subglobose or subovoid, 1–2.5 × 0.5–1.5 cm. Achenes ovoid, spindle-like, slightly compressed, with narrow ribs, 3–4 × 1.5–2 mm, villous (hairs 3–6 mm long); styles 1–2(–5) mm long, substraight or hooked, stigmas linear (Fig. 2d).

Chromosome number: n = 8, 16, 32 (Langlet 1932, Heimburger 1959, Baumberger 1970).

Pollen grains: tri- to pantocolpate (Huynh 1970a).

Distribution and habitat: Western North and South America–Canada (Yukon, Ontario, Quebec, etc.); U. S. A. (Alaska, Colorado, California, etc.); S. America–S Argentina, Chile); in grassy slopes and open forests, alt. 0-3700 m.

Specimens examined: **CANADA.** Mackenzie Distr., 25.7.1899, Cody & McCanse 3137 (K); Alberta, Craigmyle Distr., Hab Lowish Spots, 19.6.1922, AHB s. n. (K); Quebec, New Brunswick Boundary, 5 mi below Patapedia River, 24.7.1929, Rousseau s. n. (K); NW Territory, 25.7.1949, Cody 2938 (WU); Yukon, Kluane Lake Quad, 17.6.1966, Murrey 355 (MHA). **U. S. A.** Alaska, Aspen Grove, 25.6.1934, Went 27 (K); Chitina, 7.6.1935, Anderdson 2016 (K); Michigan, Sleeping Bear Dunes, 21.6.1933, Gleason s. n. (KRA); Montana, Flat Head Valley, 25.6.1901, McDouglas s. n. (K); Gallatin CO., Valley N of acajawea Peak, Bridge Range, 31.7.1938, Pennel & al. 23798 (GH); Wyoming, Albany Co., Telephone Mines, 3.8.1900, Nelson 7945 (K); Colorado, Boulder Co., Fourth of July Canyon, above Eldora, 10.8.1962, Jones s. n. (KRA); Uta, Willow Creek, 9.8.1991, Atwood s. n. (GH). **ARGENTINA.** Terra del Chubut, Valle de Laguna Blanca, 15.10.1902, Kozlowski s. n. (K); Gob. Santa Cruz, Dept. Magellanos, 10 km N of San Julian, 10 m, 31.12.1938 Eyerdam 23979 (K); Gob. Santa Cruz, Dept. Lago Argentino, near Calefate, 285 m, 11.1.1939 Eyerdam 24352 (K); Tucuman, Gob. Chubut, Los Rapidos, Rio Futaleufu, 24.1.1945

Castellanos 117925 (K); Tierra del Fuego, Rio Negro, Parque Nat. Huapi, 18.12.1954 Borba 914 (K); 32 km S of Parvenir, on road to Caleta Josefina (Onaisin), near Bahia Inutil, 2.12.1971, Moore s. n. (K); Estancia Harberton, Brown Chico, 50 m, 7.1.1967 Goodall 468 (MHA); Prov. de Mendoza, La Cerrera, Guehoca de la Sose, 19.12.1970, Roig 6766 (K). **CHILE**. La Plata, Monte Video, 1767, Commerson s. n. (P) ; In utraque America extratropica, Andes de Chile, Conception, without date, Gillies s. n. (P); Chile, Magellanes, without date, Commerson s. n. (P); Valparaiso, Alto del Puerto, in a meadow. 14.8.1940, Castroville., Santisson 93 (P); Tierra del Fuego, 32 km S of Parvenir, on road to Caleta Josefina, near Bahia Inutil, 2.12.1971, Moore s. n. (K).

Note: According to the literature, the essential characters of *A. multifida* are ovoid spindle-like carpels and achenes densely covered with hairs 3–6 mm long and embedded into these hairs, and 3-ternate to biternate basal leaf blades. In adittim, by our ofservations show that *A. multifida* is characterized by monopodial above-ground shoots, underground caudices and tap roots.

Many authors (Candolle 1817, Ulbrich 1906, Fernald 1917 and many others) described several narrow species and varieties of *A. multifida*. According to Lourteig (1956), *A. multifida* var. *saxicola* differs from var. *multifida* by longer stems and larger flowers, and var. *stylosa* from var. *tetonensis* by more hooked styles. Boraiah and Heimburger (1964) realized the detailed cytotaxonomic sudy of *A. multifida* and the allied taxa, and they noted the high polymorphism in *A. multifida* arising from its variability in height, branching, flower colour, number and length of tepals. These authors accepted *A. tetonensis* and *A. stylosa* as narrow endemics of the Rocky Mountains of the U. S. A., but in the Southern Hemisphere (Argentina and Chile) they recognized *A. multifida* var. *multifida* only.

The detail study of *A. multifida* s. l. in the natural populations and a comparative study of the serial material (everywhere including the South American localities) are very desirable, but at present time we have to regard *A. multifida* as a variable species without interspecific divisions.

5. **Anemone thomsonii** Oliver in Bot. J. Linn. Soc. **21**: 397 (1885). **Type**: TANGANYIKA. Kilimanjaro, no date, Thomson (holotype–K!).

A. thomsonii Oliver var. *friesiorum* Ulbr. in Kew Bull. **1950**: 389. Type: SOUTH AFRICA. Aberdare, prope Sattima, 3000 m, no date, Fries 2366 (holotype–UPS).

A. thomsonii Oliver var *angustisecta* Milne-Redhead & Turril in Kew Bull. **1950**: 389. Type: TANGANYIKA. Mt. Hanang, 8.2.1946, Greenway 7639 (holotype–K!).

Rhizomes oblique or ascending, somewhat thickened, 3–5 cm × 4–5 mm. Basal leaves 5–15; petioles basally sharply dilated (auriculate, 4–5 × 5–6 mm), 3–8(–15) cm long, sparsely puberulent; blades 2–3-ternate, pentagonal, 3–5 × 3–4 cm, subglabrous; bases cuneate; apices acuminate; margins lobulate-incised or crenate-dentate, sometimes ciliate; primary petiolules 10–25 mm long, secondary petiolules 2–4 mm long; leaflets biternate, with many linear-lanceolate ultimate lobules. Scapes 1–2, axillary (above-ground shoots monopodial), 10–25(–70)cm long, sparsely puberulent; cymes 1 (rarely 2)-flowered. Bracts 3, very reduced, sessile; blades deeply divided, with 3–many-lobed ultimate lobules, obtriangular or lanceolate, 1.5–2 × 1–2 cm, sparsely puberulent. Pedicels 3–10(–15) cm long, sparsely puberulent. Tepals 10–18, linear-lanceolate, with narrow bases and apices, emarginate or variously divided at the apex, dimorphic (in two circles), white, pinkish or blue, 15–20(–30) × 3–7 mm, densely puberulent or sometimes subglabrous, basal veins 3–5, anastomosing veins 3 or absent (in inner tepals). Stamens 5–7 mm long, with linear, basally slightly dilated filaments, ellipsoid anthers and narrow connectives, apically dilated and with conjuctions. Carpels cylindroid, 4–5 mm long, densely

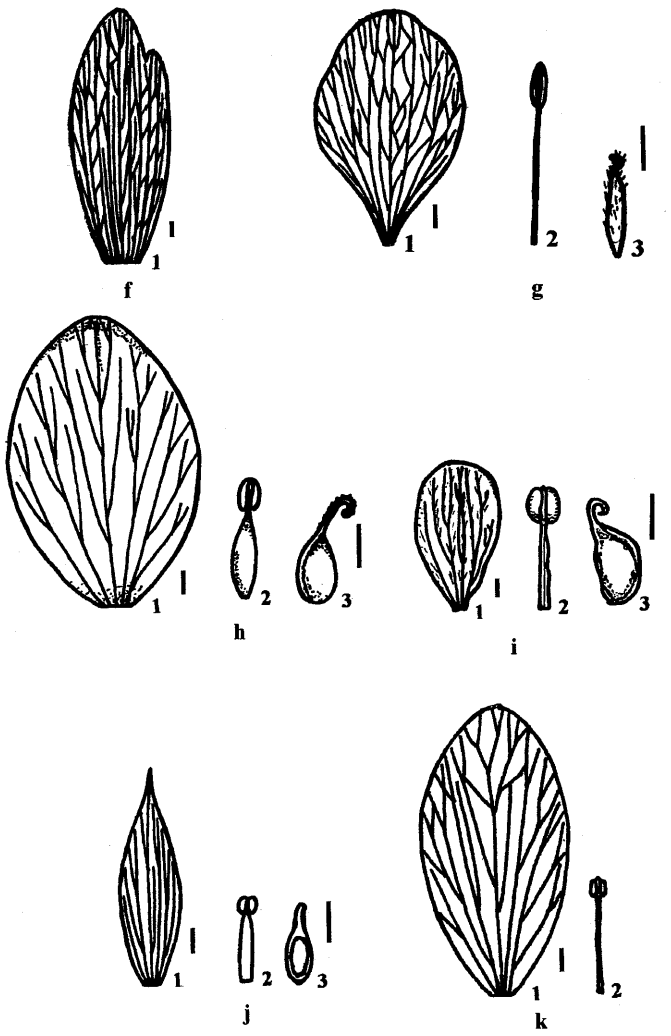

Fig. 1 (Continued). Flowers of *Anemone* species from the Southern Hemisphere (continued). f. *A. caffra* (South Africa. Adjuvantibus Tyson, Flanagan, 11.1897, Glass, WU). g. *A. sumatrana* (S. Annam. Langbian Peak, 4.1980, Closs, BM). h. *A. helleborifolia* (Peru. Montepungo, 5 km E. of Surcubamba Village, 1.1939, Stork & Horton, K). i. *A. peruviana* (Peru. 1834, Mathews 587, P). j. *A. jamesonii* (Lourteig, 1951). k. *A. sellowii* (1: Brasil. 18.10.1927, Zerny, WU; 2: Lourteig, 1956). l. *A. assibrasiliana* (Lourteig, 1956). 1: Petal. 2: Stamen. 3: Carpel. Scale indicates 1 mm.

covered with hairs 3–4 mm long; styles straight, ca. 1 mm long; stigmas capitate, puberulent (Fig. 1d). Fruiting heads subglobose, 10–15 mm long. Achenes cylindroid, basally narrowed, asymmetric, 2.5–4 × 2–2.5 mm, having lateral ribs, densely pubescent (hairs 3–4 mm long); styles conic, substraight, apically curved, lanate (hairs ca. 0.5 mm long), ca. 1 mm long; stigmas subcapitate (Fig. 2e).

Chromosome number: n = 8 (Hedberg and Hedberg 1977).

Pollen grains: pantocolpate (Huynh 1970a).

Distribtion and habitat: E. Africa, mainly on slopes of Mt. Kilimandjaro (Kenya, Uganda, Sudan, Ethiopia, Tanzania); in grassy slopes, mainly moist or boggy, rocky places on limestone, alt. (1000–)2500–4500 m.

Specimens examined: **ETHIOPIA**. Mt. Chillalo, 12000 ft., 1.1926, H. Scott s. n. (K); Bale Prov., 17 mile W. of Curie or Dinchu, on Main Shashamane to Goba Road, 28.5.1972, Asherson 168/12944 (WU). **KENYA**. Mt. Elgon, versant Est Mission de Como, 28.7.1933, Aramburg & al. s. n. (P); Aberdare Mts. Naivasha-Nyeri Track, 10500 ft., 28.10.1934, Taylor 1385 (BM); Mt. Kenya, 11500 ft., 5.1935, Synge 1859 (BM); Mt. Aberdare, 2900 m, 7.1947, no collector's name (WU); Mt. Kenya, Sagana Route, 9800 ft., Schelpe 2789 (BM); above Japata estate, 3150 m, 9.5.1948, Hedberg 841 (BM); N Nyeri Distr., Mt. Kenya, 1200 ft., subalpine zone, Sirimon Track, 4.4.1975, Hepper & Field 4854 (BM); Aberdare Mt., Kinangop, 12500 ft., 30.10.1954, Taylor 1475 (BM); Kilimanjaro Mt., Bismarck Pelios Hills, 11.1.1957, Napper 616 (BM); Cherangani Hills, above Juniperus forest, Arror Valley, 26.8.1969, Mabberley & McCall s. n. (BM); Eldego Distr., Cherangani Highway near Makutano, 2900 m, 6.2.1986, Townsend 2363 (K). **SUDAN**. Mts. Matong, 12.2.1936, Johnston 1512 (K); Mt. Kilimanjaro, 3.3.1936, Cooper 28 (BM). **TANZANIA**. Kilimanjaro Zone, Mt. Kinangop, prairies alpine, 2100 m, 20.2.1912, Alluaud 288 (P); Kilimanjaro Mt., Gesteinsfluren in der Hochgebirgszene, 3500–4600 m, 12.1929, Wettstein 3029 (WU); Kilimanjaro, 2800–3400 m, Schilieben 4779 (P); Arusha Distr., Mt. Meru, E side of Arusha National Park, 8300 ft., 23.4.1969, Greenway & Kanuri s. n. (K). **UGANDA**. Jackson's Summit of Elgon, 1400 ft., 21.12.1933, Tothill 24018 (BM); Mt. Elgon: Mudange, 11000 ft., 8.1934, Synge s. n. (BM); 8.10.1961, Rose 10139 (K).

Note: This species was described in 1885 and for many years was included in section Pulsatilloides, together with other African *Anemone* species. In 1906 Ulbrich separated *A. thomsonii* in the monotypic ser. Kilimandschariceae within sect. Pulsatilloides, and only recently Tamura (1991) accepted it as a representative of the distinct monotypic sect. Kilimandscharica (Ulbr.) Tamura.

According to the results of our study, *A. thomsonii* differs from taxa of sect. Pulsatilloides considerably because its plants have short and firm rhizomes (not caudices like in the other sect. Pulsatilloides taxa), basal leaf petioles basally auriculate and monopodial above-ground shoots. Other important distinctions include the distinctly stalked carpels and achenes with short styles 1–2 mm long, and short capitate stigmas. Therefore, we confirm the opinion of Tamura (1991) about *A. thomsonii* standing apart from the Pulsatilloides taxa, at least, at a section level.

Three varieties of A. *thomsonii (*vars. *thomsonii, friesiorum, angustisecta)* differ mainly in basal leaf blade shape which is a rather variable character, and without a detailed study of them it is unrealistic to accept or reject them.

6. **Anemone capensis** (L.) Lam., Dict. Suppl. **2**: 296 (1824). **Type**: "Ad Caput Bonae Spei in hiatu rupis ad verticem montis Tafelberg et in latere orientali montium Duywels et Tafelberg", no date, Thunberg & Ecklon (holotype–P!).

Atragene capensis L., Sp. Pl. 764 (1753). Type: Cod. N 4026 (syntype– LINN!).

Atragene capensis Thunb., Fl. Cap. 3 (1859), nom. superfl.

Anemone capensis (L.) Harvey var. *tenuifolia* Harvey, Gen. S. Afr. Pl. 2 (1868).

Pulsatilla africana Spreng., Syst. **2**: 664 (1825).

Pulsatilla tenuifolia Spreng., Syst. **2**: 664 (1825).

Caudices vertical or ascending, branched, lignified (semi-shrubs), 5–10 mm in diameter and 3–5 cm tall. Basal leaves non-rosetteous, 3–7; petioles basally vaginated, 3–5 cm long, glabrous outside and villous inside; blades 3-ternate, pentagonal, coriaceous, 5–7 × 10–15 cm, subglabrous;

bases cordate; margins with many acute lobules, apices acute; leaflets oblanceolate, 2-ternate; petiolules of the first order 2–3 cm long, petiolules of the second order 1–2 cm long. Stems 10–30 cm long, lignified and puberulent; cymes 1–2-flowered. Bracts 3, bracteoles paired; all of them subsessile; blades undivided but acutidentate, lanceolate, 2–4 × 1–2 cm, villous. Pedicels 3–5(–15)cm long, villous. Tepals 20–25, linear-lanceolate, apically acute, yellowish or whitish, 25–50 × 3–25 mm, strictly dimorphic: outer ones 15–25 mm wide, pilose, with 5–9 basal veins and more than 10 anastomosing veins; inner ones 3–5 mm wide, puberulent only along central vein, with 3–5 veins and without anastomosing veins. Stamens 7–10 mm long, with filiform filaments, ellipsoid anthers and wide connectives. Carpels oblong-ovoid, slightly compressed, 5–7 mm long, densely covered with hairs 3–5 mm long; styles straight or apically curved, 5–7 mm long; stigmas linear (Fig. 1e). Achene heads subglobose. Achenes spindle-like, slightly compressed, apically narrowed, 5–7 × 1.4–1.6 mm, densely covered with dimorphic hairs (basal and apical hairs ca. 0.5 mm long, middle ones 1–1.5 mm long); styles 5–7 mm long, straight or curved, glabrescent; stigmas linear (Fig. 2f).

Chromosome number: unknown.

Pollen grains: pantoporate (Huynh 1970a).

Distribution and habitat: South Africa. Cape Distr.; in grassy localities, alt. 300–100 m.

Specimens examined: **SOUTH AFRICA**. Cap de Bonne Esperance, no date, Drege s. n. (P); Drakenstubergen, 1838, Drege 3786 (P); Montis Labularis, Kirstenbosch, 800 ft., 8.1882 MacBarn s. n. (K); Cape Distr.: 1000 ft., 7.1890, Gamble 22096 (K); 9.1890, Eckleton & Zeyher s. n. (BM; WU); Muiscuburg, 20.4.1929, Solter 232/2 (BM); Du Caire au Cap, Constantia Cape Colon, 9.1907, Cassner 1250 (P); SW Cape: Stellenbosch, Jonkershoek Valley, Dwarsberg Taril, 1000 m, 28.8.1963, Bos s. n. (K); Platberg, Eksteenskloof, 2000 ft., 3.12.1969, Oliver 3035 (K).

Note: This taxon was described by Linnaeus (1753) under *Atragene capensis*. Harvey and Sonder (1859) recognized it as *Anemone capensis* including two varieties; vars. *capensis* and *tenuifolia*. *Anemone capensis* is unique within genus *Anemone* in having a semi-shrubby habit with caudices, tap roots and non-rosetteous, distinctly lignified, above-ground shoots. At present this species is the only representative of sect. Pulsatilloides and it differs from the other South African *Anemone* species (sect. Alchimillifolia) in its spindle-like carpels and achenes, more tepals (20–25), linear-lanceolate and pilose, and 3-ternate subglabrous coriaceous leaves. We have no basis to confirm or reject the forementioned varieties *capensis* and *tenuifolia* because of the rather limited herbarium material of this taxon.

7. **Anemone caffra** (Ecklon & Zeyher) Harvey, Gen. S. Afr. Pl. 2 (1868)–*Pulsatilla caffra* Ecklon & Zeyher, Enum. Pl. Afr. Austr. **1**: 59 (1848). **Type**: SOUTH AFRICA. Katberg, 4000–5000 ft., 9.11.1832, Herb. Drege 3571 (P!, K!).

Anemone alchimilifolia E. Mey, in Pritz. Anem. Rev. 54 (1841). Type: "Habitat in collibus apricis graminosis apud sedes Tyali Caffrorum principis ad pedem montium Chami et Winterberg", Ecklon & Zeyher (B).

Caudices ascending, short, branched, 5–10 mm in diameter, and firm tap-roots. Basal leaves 5–7(–9); petioles basally vaginate, 5–15 cm long, villous; blades 5–7(–9)-lobed, rounded, coriaceous, 5–7 × 6–15 cm, sparsely pubescent along veins; bases cordate; margins dentate, apices obtuse; lobes rounded. Scapes 15–20 cm long, subglabrous; cymes 1-flowered. Bracts 3; sessile, reduced; blades 3-lobed or only 3-dentate, lanceolate, 2–3 × 1.2–1.5 cm, pubescent. Pedicels 10–12 cm long, pilose. Tepals 10–12, linear-lanceolate, with wide bases and wide but sharply acute apices,

monomorphic, whitish-pink, 30–45 × 10–15 mm, scarcely pubescent or subglabrous; basal veins 5–9, anastomosing veins more than 10 (Fig. 1f). Stamens 5–10 mm long, with basally distinctly dilated filaments, ellipsoid anthers and wide connectives. Carpels oblong-ovoid, 4–5 mm long, densely covered with hairs 1–2 mm long; styles conic, apically curved, 6–8 mm long; stigmas linear. Achene heads subglobose. Achenes spindle-like, not compressed, 6–10 × 4–5 mm, densely covered with hairs (basally 1–2 mm long, in middle part 4–5 mm long); styles conic, straight, 3–5 mm long; stigmas linear (Fig. 2g).

Chromosome number: n = 8 (Schuettpelz et al. 2002).

Pollen grains: pantoporate (Huynh 1970a).

Distribution and habitat: South Africa, from Cape to Natal; on grassy slopes alt. 700–2500 m.

Specimens examined: **SOUTH AFRICA**. Katberg, 4000–5000 ft., 9.11.1832, Herb. Drege 3571 (P, K); S East Africa, Pondoland, 1857, Baehmann s. n. (P); District of Queenstown, Cape of Good Hope, 1860, Cooper 246 (BM, K); Mountains round Giahami, 2000–3000 ft., 12.4.1888, Zeyher 3961 (K); Adjuvantibus, Tyson, Flanagan, 11.1897, Glass s. n. (WU); Plantes du Cap, Continuavit Mac Owan, in graminosi, 2000 ft., 11.1897, Glass s. n. (P); Natal: Polela Distr., Bulwu, Mahazahga Mt., Sanset Farm, 10.11.1973, Hillard & Burtt 7169 (E); E Cape: Barkly East Distr., Witteberg, Beddgelert, 6200 ft., 1.12.1981, Hillard & Burtt 14608 (E); Ongeluks Nek, 5.12.1985, Hillard & Burtt 18664 (E).

8. **Anemone fanninii** Harvey, Gen. S. Afr. Pl. 2 (1868). **Type**: SOUTH AFRICA. Cape of Good Hope, Natal, Dargla Zarm, 1864, Fanni (K!, BM!).

Caudices ascending, short, branched, 5–8 mm in diameter, and firm tap-roots. Basal leaves 5–7; petioles basally vaginate, 15–25 cm long; blades 5–7 lobed or 5-parted, rounded, coriaceous, 12–20 × 12–20 cm, villous; bases cordate; margins acutidentate, apices obtuse; lobes or segments semirounded. Scapes 2–5, 15–30 cm long, pilose; cymes umbelliferous, 1–3-flowered. Bracts 3, reduced, sessile; blades 3-lobed, lanceolate, 2–4 × 2–2.5 cm, villous. Pedicels 10–15 cm long, villous. Tepals 12–20, lanceolate, white, dimorphic, 25–50 × 5–15 mm, pilose; basal veins 5–9, anastomosing veins more than 10. Stamens 8–10 mm long, with slightly dilated filaments, ellipsoid anthers and wide connectives. Carpels oblong-ovoid, 5–7 mm long, densely covered with hairs 2–4 mm long; styles straight, apically curved, 5–10 mm long, covered with hairs 1–2 mm long; stigmas linear. Achene heads subglobose. Achenes oblong-ovoid, 5–10 × 4–5 mm, pubescent (hairs 3–6 mm long); styles conic, straight, 6–12 mm long; stigmas linear (Fig. 2h).

Chromosome number: unknown.

Pollen grains: pantoporate (Huynh 1970a).

Distribution and habitat: South Africa. Natal; in grassy localities, alt. 1200–2500 m.

Specimens examined: **SOUTH AFRICA**. Natal, 18.2.1886, Adlam s. n. (K); Natal, Mt. Martrburg, 3600 ft., without date, Adlam 1023 (K, BM); Adlam 1029 (P); Natal, Bergville, slopes of Mt. Aux Soreveso, 6–7000 ft., 1.1894, Hanagan s. n. (P); Natal, Richmond, 2800 m, 25.3.1903, Medley 10083 (P); Tabam Hlope, 6–9000 ft., 14.10.1907, Wylie 2025 (E); Distr. Bergville, Tugella Gorge, Nat. Park, 16.12.1928, Galpin 10181 (K); Nat. Park, 28.8.1930, Hutchinson 4515 (K); Drakensberg Distr., 9.1949, Gunn s. n. (K); Impendnle, 24 mi NW of Himeville, 25.10.1955, Margis 937 (K); Underberg Distr.: Cobham Forest Station, Ndlowini, Frontbeck, 6000 ft., 8.12.1980, Hilliard & Burtt 13363 (E); Sani Pass, 6600 ft., 14.12.1984, Burtt 17970 (E).

Notes on *A. caffra* and *A. fanninii*. Having a lot of common characters (oblong-ovoid or spindle-like densely pubescent carpels and achenes, more than 10 large pubescent tepals, with more than 10 anastomosing veins, palmately lobed coriaceous basal leaf blades, and reduced 3-lobed or 3-dentate bracts), *A. caffra* and *A. fanninii* were frequently regarded as the same species, viz., *A. alchimillifolia*. These plants are characterized with close morphological characters; branched caudices, tap-roots and semi-

rosetteous sympodial above-ground shoots.

Nevertheless, according to our data, they differ by size and pubescence of basal leaf blades (5–7 × 6–15 and 12–20 × 12–20 cm, subglabrous or villous), scapes (solitary flowers or 2–3-flowered umbelliferous inflorescences), tepals (10–12, monomorphic or 12–20, dimorphic), carpel and achene pubescence (hairs dimorphic, 1–2 and 4–5 mm long, and monomorphic, 3–6 mm long) and style size (3–5 or 6–12 mm long). Therefore, we regard *A. caffra* and *A. fanninii* as distinct species. Ulbrich (1906) mentioned four varieties within *A. caffra*; vars. *caffra*, *grandiflora*, *schlechteriana* and *pondoensis*, and within *A. fanninii* two varieties, vars. *genuina* and *parviflora,* and at present we have no basis on which to accept or reject them.

9. **Anemone angustiloba** H. Eichler in Bibl. Bot. **31**: 8 (1958). **Type**: INDONESIA. Nord-Sumatra, Atjeh, Mt. Losir, Mittel-Gipfel, Bivouac 6, 3250–3300 m, 3.2.1937, Van Steenis 8632 (holotype–K!).

A. rivularis auct. non Buchan. ex DC.: Steenis in Bull. Bot. Gard. Btzg. **17**: 176 (1948).

Caudices vertical or ascending, branched, 3–10 cm × 7–15 mm. Basal leaves 3–10; petioles basally vaginate, 5–10(–15) cm long, puberulent; blades ternate, reniform-pentagonal, 3–5 × 4–6 cm, sparsely puberulent, bases crenate; apices acuminate; margins dentate; petiolules 3–5 mm long, central leaflet 3-lobed or deeply incised, rhombic-ovate; lateral leaflets 2-parted or lobed, asymmetric. Scapes 20–50 cm long, puberulent in upper part; cymes 1–2-flowered, axillary. Bracts 3; petioles 10–15 mm long; blades 3-parted, wide-lanceolate, dentate, 1.5–2 × 1.5–3 cm, sparsely puberulent. Pedicels 5–7 cm long, pubescent. Tepals 5–7, oblong-elliptic, with wide bases and apices, white, 15–20 × 3–6 mm, sparsely pubescent, basal veins 5–7, anastomosing veins 3–5. Stamens 3–4 mm long, with filiform filaments, ellipsoid anthers and narrow connectives. Carpels narrow-ovoid, slightly compressed, 3–4 × 1.2–1.5 mm, glabrous; styles 1–1.5 mm long, uncinate, stigmas linear. Fruiting heads subglobose, ca. 1 cm long. Achenes narrow-ovoid, slightly compressed, 3–4 × 1.2–1.5 mm, glabrous; styles 1–1.5 mm long, curved; stigmas linear.

Chromosome number: unknown.

Pollen grains: unknown.

Distribution and habitat: Indonesia–Sumatra (Atjeh, Mts. Losir and Kemiri), Indo-China (Annam, Vietnam–Kontum, Quangnam); on grassy slopes, alt. (1800–) 3200–3300 m.

Specimens examined: **INDONESIA**. N Sumatra, Gaju et Alas Landa, N Atjeh, Mt. Losir, central top. Bivouac 6, 3300 m, 3.2.1937, Van Steenis 8632 (K). **ANNAM**. Nha Trang, 20.1.1934, Krempf (P). **VIETNAM**. Prov. Gia Lai Kontum, Konplong, Wan Deu, 28.5.1985, LX-VN 2271 (P); Prov. Lam Dong, 14 km NNW from Dalat city, Pinus keslya forest, 174–1760 m, 11.3.1997, Averjanov & al. NVH 2524 (P); Prov. Lam Dong, Distr. Lac Duong, municipalite Da Cahay, 35 km NE from Dalat City, Gia Rinh Mt., 1500 m, 19.3.1997, Averjanov & al. VH 2883 (P).

10. **Anemone sumatrana** de Vriese, Pl. Jungh. **1**: 76 (1851). **Type**: INDONESIA. Sumatra, Junghun 905.298.140 (U).

A. poilanei Gagnep. in Bull. Soc. Bot. Fr. **76**: 315 (1929). Type: Annam. Nha-trang, Foret, 1800 m, 26.5.1922, Poilane 3707 (holotype–P!).

Caudices vertical or ascending, branched, 2–5(–10) cm × 5–7 mm. Basal leaves 3–10; petioles 12–15(–25) cm long, basally sharply dilated (auriculate, 4–5 × 10–12 mm), densely pubescent; blades ternate, rhombic-pentagonal, 4–7 × 4–8 cm, sparsely pubescent; bases crenate; apices long-acuminate; margins incised-dentate; central leaflet 3-lobed or deeply incised, rhombic-ovate, on petiolule 3–10 mm long; lateral leaflets similar to central ones but mainly 2-parted or lobed, subsessile and asymmetric. Scapes 1–

2, 20–60(–70) cm long, densely puberulent in upper part; cymes 1–3(–5)-flowered, axillary. Bracts 3; petioles 10–15 mm long; blades 3-lobed, wide-lanceolate, 1.5–2.5 × 1.5–2 cm, sparsely puberulent. Bracteoles frequently present, small, reduced, 3-lobed or undivided. Pedicels 5–15 cm long, densely pubescent. Tepals 5, broad-ovate to obovate, with acuminate bases and wide apices, white-yellowish, 10–15 × 8–12 mm, sparsely pubescent, basal veins 3–5, anastomosing veins solitary. Stamens 3–5 mm long, with filiform filaments, ellipsoid anthers and wide connectives. Carpels narrow-elliptic, slightly compressed, asymmetric, 2–3 mm long, glabrous, marginal ribs solitary, ca. 0.1 mm wide; styles curved, ca. 1 mm long; stigmas linear (Fig. 1g). Fruiting heads subglobose, 3–4 mm long. Achenes narrow-ovoid, slightly compressed, with solitary marginal ribs, 3–4 × 1.2–1.5 mm, glabrous; styles hooked, 0.3–0.5 mm long, stigmas linear (Fig. 2i).

Chromosome number: unknown.

Pollen grains: unknown.

Distribution and habitat: Sumatra, Malay Peninsula, N Thailand, S Annam and Laos, in forests, alt. 800–1700 m.

Specimens examined: **INDONESIA**. N. Sumatra. Hochankola, Lubu radja, 5–5800 ft., in silvis cacuminis, no date, no collector's name (P); Korinchi Peak, 6300 ft., 2.4.1914, Closs s. n. (BM); 2000 m, 7.4.1920, Bannemeyer 9110 (WU); Gunung Bandahara, 25 km NNW of Kutatjane, 2600 m, 24.1.1972, de Wilde s. n. (L). **ANNAM**. Nha-trang, Foret, 1800 m, 26.5.1922, Poilane 3707 (P); Deut du Eigre, Prov. Quang-tri, 9.9.1924, 8.9.1929, Poilane s. n. (P); Entre Dangkia et Dang-li, Prov. Hand Donnai, 29.1.1934, Poilane s. n. (K);.Quang Nam, N of Village Hoi de Tumh, 18000 ft., 25.11.1941, Poilane 32036 (K); Massif du Ngok Range, pro du Kontum, 2200 m, 29.5.1947, Poilane (K); Langbian Peaks, 7000 ft., 4.1980, Closs (BM). **LAOS**. Paksong plateau des Boloven, Prov. Bassac, 1200 m, 19.9.1928, Poilane 15638 (P). **MALESIA**. Sungai Terla, Cameron Highlands, Pahang, 3900 ft., 18.5.1936, Holltum s. n. (K).

Notes on *A. angustiloba* and *A. sumatrana*. These two species of sect. Rivularidium occur in SE. Asia, and Eichler (1958) regarded *A. angustiloba* as close to *A. rivularis*, differing from the former in the smaller size of basal and involucral leaves, scapes and flowers. We confirm their affinities and noted their common morphological features (both of them are plants with caudices, tap-roots and monopodial aboveground shoots). *Anemone sumatrana* was described by de Vriese (1851) as a species also allied to *A. rivularis*, and later the close taxon, *A. poilanei*, was described from the foregoing affinities (Gagnepain 1929), occurring in SE. Asia (mainly Malasia, Vietnam, Laos, etc.).

According to the results of our examination of herbaria, *A. sumatrana* differs from *A. angustiloba* by its five white-yellowish smaller tepals with solitary anastomosing veins, 3–5-flowered cymes, and shorter (0.3–0.5 and 1–1.5 mm long) achene styles. Unfortunately, their chromosome numbers and pollen grain morphology are unknown.

11. **Anemone helleborifolia** DC., Syst. Nat. **1**: 211 (1817). **Type**: "America meridionale, Regni Chilensi, Huasa-huasi", no date, Dombey (holotype–P!).

A. aequinoctialis Poeppig, Fragm. Synops. Dissert. 28 (1833). Type: "Peruviae montosis ad Cuchero et Cassapi, Andes de Huanuco", no date, Poeppig 1529 (holotype–P!).

Caudices vertical or ascending, branched, ca. 4–6 × 1–1.5 cm, tap-roots vertical, 5–15 cm long. Basal leaves 3–5(–10); petioles 15–25(–40) cm long, basally sharply dilated (auriculate), sparsely puberulent; blades ternate, appearing palmatifid because lateral leaflets deeply dissected, pentagonal, coriaceous, 8–15 × 12–18 cm, glabrous; bases cuneate; apices acuminate; margins serrate-incised; petiolules 5–10 mm long; central leaflets 3-lobed; lateral leaflets 2-parted, asymmetric, with deeply bilobed outer segments. Scapes 50–100(–150) cm

long, subglabrous; inflorescences compound, 3–4 times dichotomically branched, many-flowered. Bracts 3–5, on wide petioles 3–5 mm long; blades look like palmatifid and similar to those of basal leaves, pentagonal; segments narrow-rhombic, sparsely puberulent. Lower bracteoles 3-parted to 3-lobed, upper ones 3-lobed or entire, small. Pedicels 5–15 cm long, glabrous. Tepals (4–)5, wide-lanceolate, with wide bases and acuminate apices, white-yellowish, 6–10 × 3–4 mm, glabrous, basal veins 3–5, anastomosing veins absent. Stamens 3–4 mm long, with lanceolate filaments, globose ellipsoid anthers and narrow connectives. Carpels subovoid, asymmetric, apically narrowed, slightly compressed, glabrous, ca. 2 mm long; styles basally curved, ca. 2 mm long; stigmas linear (Fig. 1h). Fruiting heads subglobose, 5–8 mm long. Achenes subovoid, asymmetric, ribbed, 2–3 × 1.5 mm, glabrous; styles basally curved, 2–3 mm long, stigmas linear (Fig. 2j).

Chromosome number: n = 24 (Baumberger 1970).

Pollen grains: 3-colpate (Huynh 1970a).

Distribution and habitat: South America. Peru, Andes; in forests, alt. 2000–3800 m.

Specimens examined: **PERU**. Mont. ad Cuchero et Cassapi, Andes de Huanuco", no date, Poeppig 1529 (P); Montepungo, 5 km E of Surcubamba Village, 3000 m, 13.1.1939, Stork & Horton s. n. (K); Depto Huancavelica, Prov. Tayacaja, Pampas-Salcabamba Trail, 2500 m, 16.1.1939, Stork & Horton s. n. (K); Depto Junin, Prov.Tarma, between Palca and Carpapata, 2900 m, 18.3.1939, Stork 10977 (GH); Depto Cusco, Prov. Urubamba, Maccu Picchu, 3000 m, 18.11.1947, Ferreyra 2692 (P); Depto Lima, Prov. Yauyos, Cerro Capia abajo de Tupe, 2800 m, 5.8.1952, Cerrate 1086 (P); Prov. Canta Cerca Cullnay, 7.3.1958, Ferreya 12965 (P); Depto Arequilpa, Prov. Caravelli, Lomas de Antiquipa, 3600–3800 m, 27.11.1958, Ferreyra 13528 (P); Depto Libertad, Prov. Bolivar, Longotea, 2800 m, 18.2.1976, Goepfert & Jparaquire s. n. (P).

12. **Anemone peruviana** Britton in Ann. N. Y. Acad. Sci. **6**: 229 (1892). **Type**: PERU. Anamantanya, 1834, Mathews 537 (K!, BM!).

Caudices ascending, branched, 5–6 × 1 cm, tap-roots vertical or ascending. Basal leaves 3–5; petioles 15–30 cm long, basally sharply dilated (auriculate), sparsely puberulent; initially ternate blades appear palmatifid due to the deeply dissected lateral leaflets, pentagonal, coriaceous, 6–9 × 9–15 cm, sparsely puberulent; bases cuneate; apices acuminate; margins serrate-incised, with mucronate-pointed teeth petiolules 3–5 mm long; central leaflet 3-lobed; lateral leaflets 2-parted. Scapes 40–80(–120) cm long, subglabrous; inflorescences many-flowered, compound umbellate. Bracts 3–5, on narrow petioles 1–3 mm long; blades appear palmatifid, similar to those of basal leaves, but smaller, 3–5 cm long, rhombic-pentagonal; segments narrow-rhombic, sparsely puberulent. Bracteoles 3–5-lobed, 1–2 cm long. Pedicels 5–15 cm long, puberulent. Tepals 4–5(–7), wide-lanceolate, with wide bases and acute or acuminate apices, white, 12–15 × 4–5 mm, glabrous, basal veins 5, anastomosing veins absent. Stamens 3–4 mm long, with basally dilated filaments, ellipsoid anthers and wide connectives. Carpels subovoid, slightly compressed, glabrous, 1.5–2 mm long; styles substraight but apically uncinate, ca. 1 mm long (Fig. 1i). Achene heads subglobose, ca. 1 cm long. Achenes ovoid, 2–3 × 1.5 mm, glabrous; styles apically uncinate, 1–2 mm long, stigmas linear (Fig. 2k).

Chromosome number: unknown.

Pollen grains: 3-colpate (Huynh 1970a).

Distribution and habitat: South America. Peru, Andes; in forests; alt. ca. 3000 m.

Specimens examined: **PERU**. Salina, 1877, Lechler 2120 (BM).

Notes on *Anemone helleborofolia* and *A. peruviana*. These species differ from other taxa of sect. Rivularidium occurring in South America by their basal leaves those are coriaceous and subglabrous and resemble the

leaves of some species of in *Helleborus* (Ranunculaceae). Consequently, their initial names "pedata" and "digitata" reflected the basal leaf characters. The other essential characters of these taxa are pinnatisect leaflets, petiolate involucral leaves, compound many-flowered inflorescences, 4–5 large tepals with wide bases and acuminate apices, and without anastomosing veins, stamens with dilated filaments, and rather small achenes (2–3 mm long). Besides, all of them are plants with caudices, tap-roots and sympodial above-ground shoots having auriculate bases of basal leaf petioles. Moreover, both taxa are endemic to the Andes in Peru, occurring in the subalpine forests at 2000–3800 m. All these peculiarities were the base for non-accepting of *A. peruviana* and regarding it as a synonym of *A. helleborofolia* (Lourteig 1956).

As a result of our comparative study, we note the distinctions of the foregoing taxa; in the size of basal leaf blades (8–15 × 12–18 mm or 6–9 × 9–15 mm), bracts (wide petioles 3–5 mm long or narrow petioles 1–3 mm long), tepal size (6–15 and 12–15 mm), and achene styles (basally curved, 2–3 mm long or uncinate, 1–2 mm long). Unfortunately, the data on the chromosome number of *A. peruviana* are absent, and the real state of this species remains debatable.

13. **Anemone jamesonii** Hook. f., Icon. Pl. 3. New Ser.: 670 (1844). **Type**: "Only on the Mountain of Pillzum, Andes of El Equador, at 12000 ft.", 1836, Jameson 86 (holotype–K!).

Rhizomes ascending short branched, 4–5 mm in diameter. Basal leaves 3–5; petioles 10–15 cm long, basally sharply dilated, sparsely puberulent; blades 2–3-ternate, subtriangular, 5–7 × 6–10 cm, sparsely puberulent; bases cuneate; apices obtuse; margins dissected-lobulate, ultimate lobules obtuse; primary petiolules 2–3 cm long; central leaflet rhombic-ovate, ternate, but appearing pinnatisected because its central segments are pinnatiparted and on secondary petiolules ca. 10 mm long, and lateral segments biparted and subsessile. Scapes 15–30 cm long, puberulent; cymes umbellate, 2–3-flowered. Bracts 3–5, on petioles 3–5 mm long; blades biternate, triangular, dissimilar to those of basal leaves, sparsely puberulent; leaflets pinnatisected, on petiolules 5–8 mm long and with acute ultimate lobules. Pedicels 4–6 cm long, puberulent. Tepals 5, ovate-oblong, with narrow bases and wide apices, purple-red, 8–15 × 5–7 mm, sparsely puberulent along central veins, basal veins 3–5, anastomosing veins absent or solitary. Stamens 3–4 mm long, with dilated filaments, globose anthers and narrow connectives. Carpels oblong-ovoid, asymmetric, compressed, ribbed, glabrous, ca. 2 mm long; styles uncinate, ca. 1 mm long. Fruiting heads globose, ca. 10 mm long. Achenes ovoid, asymmetric, compressed, with narrow lateral ribs, ca. 2 × 2 mm, glabrous; styles hooked, ca. 1 mm long, stigmas linear.

Chromosome number: unknown.

Pollen grains: unknown.

Distribution and habitat: South America, Ecuador, Andes (Pillzum, Quito); on open slopes, alt. ca. 4000 m.

Specimens examined: **ECUADOR**. Andes de Quito, 12000 ft., 1836, Jameson s. n. (K); Azway Prov., Cajas, Totorococha, Mazan Valley, Nation. Recreation, 4000 m, 12.9.1987, Ramsey 487 (K).

Note: Lourteig (1956) noted as a type for this taxon "Ecuador, Prov. Azuay, Cerro Pillzhum, alt. 12000 ft., 1836, leg. Jameson 86 (K)", but in the protologue of *A. jamesonii* of Hooker (1844), there is "Only on the Mountain of Pillzum, Andes of El Equador, at 12000 ft., 1836, Jameson 86", therefore, we regard the specimen from K having the such label as the holotype. Hooker believed this taxon allied to *A. triternata* "differing from it in its much larger size, petiolate bracts and few tepals and short glabrous heads of carpels each

tipped with a hooked subulate style". The most characteristic features of *A. jamesonii* are 2–3-ternate basal leaves, distinctly petiolate 2-ternate bracts, 2–3-flowered cymes, 5-tepaled monomorphic perianth and rather small achenes with minute styles (ca. 1 mm long). This species is a member of the subgroup within the ser. Jamesonii which is characterized by tepals with narrow bases and wide apices without anastomosing veins and basally sharply dilated basal leaf petioles.

14. **Anemone sellowii** Pritz. in Linnaea **15**: 107 (1841). **Type**: BRAZIL. Habitat in Brasilia, Sellow, Coll. Pl. Brasil 891 (holotype–B).

A. glazioviana Urban in Linnaea **43**: 255 (1882). Type: BRAZIL. Prope Rio de Janeiro, Glaziou 4744 (holotype–P!).

Rhizomes oblique, short, branched, 7–10 cm × 3–5 mm. Basal leaves 1–2(–3); petioles basally sharply dilated ("ears" 10 × 10 mm), 10–15(–40) cm long, sparsely pilose; blades ternate, rounded-pentagonal, coriaceous, 8–15 × 5–10 cm, sparsely puberulent; bases cordate; margins lobulate-serrate; apices obtuse; petiolules 3–10 mm long; central leaflet 3-lobed, lateral leaflets 2-parted. Scapes 25–40(–70) cm long, sparsely puberulent; cymes 1-flowered. Bracts 3, sessile, reduced; blades entire or distally dentate, lanceolate, 10–15 × ca. 10 mm, puberulent. Pedicels 2–10 cm long, puberulent. Tepals 8–16, oblong-elliptic, dimorphic (inner ones smaller and narrower), with narrow bases and wide apices, white, pink or yellowish, 15–35 × 5–25 mm, glabrous; basal vein 3–5, anastomosing veins absent. Stamens 5–10 mm long, with filiform filaments, ovate anthers and narrow connectives. Carpels oblong-ovoid, apically narrowed, compressed, 4–5 mm long, glabrous; styles conic, substraight, ca. 1 mm long (Fig 1j). Achene fruits subglobose, 1–1.5 cm long. Achenes oblong-ovoid, asymmetric, 6–9 × 2–3 mm, basally and apically narrowed, with lateral ribs, glabrous; styles curved, ca. 4–6 mm long, stigmas linear (Fig. 2l).

Chromosome number: unknown.

Pollen grains: pantocolpate (Huynh 1970a).

Distribution and habitat: South America. Brazil; in tropical forests; alt. 1500–1800 m.

Specimens examined: **BRAZIL**. Caminbo das maciciras Itatiaya, est do Rio, no date, Kuhlmann 35811 (W); Itatiaia, prope Rio Janeiro, 7.6.1871, Glasiou 4744 (P); Terra do Itatiana: 1800 m, 27.1.1901, Hemmendorf 551 (W); 1500 m, 6.1903, Dusen s. n. (K); Staat Rio de Janeiro, Itatiaya-gebeit, subtropische Regenwald am Wege Uaromba–maciciras, 1800 m, 18.10.1927, Zerny s. n. (W); St. of Sao Paulo, Barreiro Co., Serra da Bocaina, Lageado Farm, 1600 m, 3.1951, Segadas-Vianna 2753 (P); Rio de Janeiro, Estacia do Rio, Caminto das Macicieras, Itatiaia, 4.1956, Kuhmann 20690 (WU); Santa Catarina, Campina, Riozinho, Bom Retiro, 1000 m, 24.11.1956, Smith & Klein 7913 (P); Santa Catarina, Erva Mata, Serra da Boa Vista, 1200 m, 24.10.1957, Reitz & Klein 5398 (P); Sao Paulo, Salesopolis, Boracea, Margens do Rio Claro, 15.3.1958, Kuhlmann 4333 (P); Parana, Mt. Quatro Barras, Monto Alegre, 1000 m, 15.12.1964, Hutschbach 12033 (P); Sao Paulo, Rio de Janeiro: Guanabara, Parana et Santa Catarina, 7.7.1966, Hunt s. n. (K); 23.7.1966, Hunt 6401 (K).

15. **Anemone assibrasiliana** Kuhlmann & Porto in Archiv. Jard. Bot. Rio Janeiro **6**: 114 (1933). **Type**: BRAZIL. Serra do Itatiaia, 7.1918, Porto 749 (isotype–RB). Itatiaia, Estado do Rio, 1918, Porto 16505 (paratype–WU!).

Rhizomes ascending, branched, short, 5–8 mm in diameter. Basal leaves 3–4; petioles 10–25 cm long, basally sharply dilated ("ears" 6 × 4 mm), sparsely puberulent; blades ternate, wide-rhombic, coriaceous, 5–12 × 3–6 cm, densely pubescent; petiolules 4–10 mm long; bases cuneate; apices obtuse, margins distally dentate or undivided; leaflets oblong-obovate, asymmetric, entire. Scapes 15–25(–30) cm long, sparsely pubescent; cymes 1–2-flowered. Bracts 3, subsessile; distally dentate, oblong-

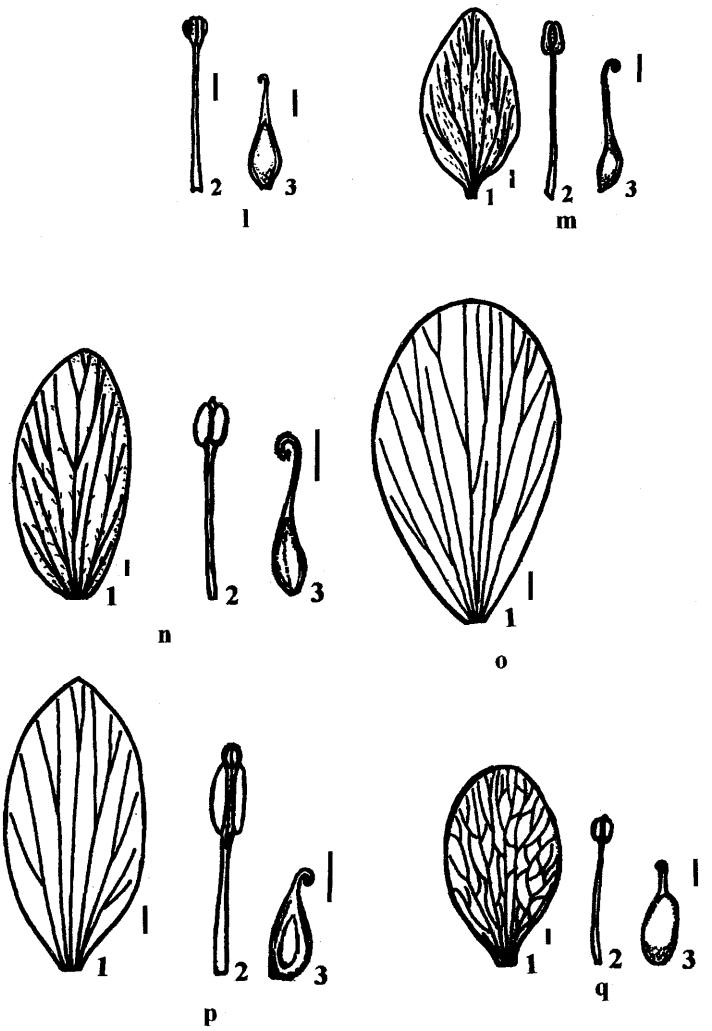

Fig. 1 (Continued). Flowers of *Anemone* species from the Southern Hemisphere (continued). m. *A. moorei* (Lourteig, 1951). n. *A. antucensis* (Chile. Andes, Buevir, San Lorenzo, 12.1873, Reed, K). o. *A. crassifolia* (Tasmania. Cradle Mt., 19.3.1931, Sutton, K). p. *A. hepaticifolia* (Chile. Prov. Morro Gonzales, 12.1851, Hohenaker, LE). q. *A. rigida* (1: Chile. San Fernando, 1.1864, Philippi, K; 2,3: Lourteig, 1951). 1: Petal. 2: Stamen. 3: Carpel. Scale indicates 1 mm.

lanceolate, 10–15 × 5–7 mm, sparsely pubescent. Pedicels 3–5 cm long, puberulent. Tepals 9–15, oblong-elliptic, with wide bases and acute apices, dimorphic, white, sparsely pubescent along veins, 15–25 × 4–8 mm, basal veins 3, anastomosing veins absent. Stamens 5–9 mm long, with sublanceolate filaments, ellipsoid anthers and wide slightly projected connectives. Carpels oblong-ovoid, asymmetric, compressed, apically long-narrowed, 2–3 mm long, glabrous; styles straight, conic, apically curved, ca. 2 mm long; stigmas linear (Fig. 1k). Fruiting heads oblong, ca. 6–10 mm

long. Achenes oblong-ovoid, asymmetric, with lateral ribs ca. 0.1 mm wide, 3–5 × 2–3 mm, glabrous; styles uncinate, 2-3 mm long, stigmas linear (Fig. 2m).

Chromosome number: unknown.

Pollen grains: unknown.

Distribution and habitat: South America. Brazil; in tropical forests, alt. 800–1000 m.

Specimens examined: **BRAZIL**. State of Rio de Janeiro, Itatiaia Nation. Park, Mt. Itatiaia, by creek "Rio Campo Bello", near "Lago Azul", 820 m, 23.6.1966, Eiten 7270 (K); Estado de Rio de Janeiro, Parque Nacional do Itatiaia, 1200 m, 2.7.1966, Emmerich s. n. (P).

Notes on *A. sellowii* and *A. assibrasiliana.* They are members of the first subgroup of ser. Jamesonii, together with *A. jamesonii.* These taxa are close because they share dimorphic tepals (8–16), large oblong-ovoid achenes with longer styles, 1–2-flowered inflorescences and sessile, reduced, entire involucral leaves. The most essential distinctions between these species include basal leaf blade leaflet shape (2–3-parted or entire), scape size (25–70 or 15–30 cm), tepals (glabrous or sparsely pubescent) and achene size (bodies 6–9 or 3–5 mm long), and styles (4–6 or 2–3 mm long). In *A. sellowii* filaments are narrow and connectives are slightly dilated, and in *A. assibrasiliana* filaments are sublanceolate and connectives considerably dilated. Therefore, their specific state unequivocal.

16. **Anemone moorei** Espinosa in Bol. Mus. Nac. Hist. Nat. Chile **18**: 26 (1940). **Type**: CHILE. Prov. Talca, Alto de Vilches, Pata de Leon, 30.1.1935, 4.12.1935, Espinosa 64658 (lectotype–SGO; isolectoty pe–K!).

Rhizomes oblique, short, branched, 4–5 mm in diameter. Basal leaves 2–4; petioles basally vaginate, 40–50 cm long, sparsely puberulent; blades ternate, coriaceous, ovate-oblong, 15–35 × 20–25 cm, glabrous; bases cordate; apices acuminate, margins dentate-serrate; central leaflets on petiolules 5–7 cm long, 3-parted or 3-lobed, ca. 20 × 15 cm; lateral segments subsessile, 2-parted or 2-lobed, asymmetric, ca. 15 × 10 cm. Scapes 40–60 cm long, subglabrous; cymes compound, 3–5-flowered. Pedicels 10–15 cm long, pubescent. Bracts 3, shortly petiolate or sessile; blades 2–3-lobed, ovate-lanceolate, coriaceous, denticulate, 8–10 × 7–8 cm, subglabrous. Bracteoles paired, sessile; blades entire or 2–3-lobed, ovate, 2–4 × 2.5–5 cm, subglabrous. Pedicels 5–10(–12) cm long, pilose. Tepals 5–7, oblong-ovate, with narrow bases and apices, white, 20–35 × 7–15 cm, sparsely puberulent along central vein, basal veins 3–5, anastomosing veins 5–7. Stamens 8–12 mm long, with slightly basally dilated filaments, ellipsoid anthers and wide connectives. Carpels oblong-ovoid, slightly compressed, asymmetric, narrowed basally and apically, ca. 2 mm long, basally sparsely puberulent; styles conic, substraight, but apically uncinate, 3–4 mm long (Fig. 1l). Fruiting heads oblong-cylindroid, 1.5–3(–4) cm long. Achenes oblong-ovoid or spindle-like, not compressed, narrowed basally and apically, 2–3 × 1–2 cm, basally sparsely pubescent; styles substraight, apically uncinate, 4–6 mm long, stigmas linear (Fig 2n).

Chromosome number: unknown.

Pollen grains: unknown.

Distribution and habitat: South America. Chile (Prov. Talca); alt. ca. 500 m.

Specimens examined: cf. type collection.

Note: *Anemone moorei* stands apart within the second subgroup of ser. Jamesonii because of the largest basal leaf blades (15–35 × 20–25 cm) having central leaflets on distinct petiolules, and the largest tepals (20–35 × 7–15 mm) having 5–7 anastomosing veins. Besides, achenes are spindle-like, not compressed, basally sparsely pubescent, with long substraight styles uncinate only apically.

17. **Anemone antucensis** Poeppig, Fragm.

Syn. Pl. 27 (1833). **Type**: "Chile australes, silvis alpinis, Pico de Pilque", 12.1832, Poeppig 751 (lectotype–G; isolectotype–P!).

Rhizomes oblique, short, branched, 4–5 mm in diameter. Basal leaves 2–4; petioles basally vaginate, 7–15(–25) cm long, puberulent; blades 3–5-parted or 3–5-lobed, pentagonal, 3–6 × 6–10 cm, scarcely puberulent; bases cuneate; apices acuminate; margins serrate; segments rhombic-ovate, lobulose or dentate, apically obtuse. Scapes 25–30(–70) cm long, subglabrous; cymes simple 1–2(–3)-flowered. Bracts 3, subsessile; blades 3-parted or 3-lobed, rhombic-oblong, 4–6 × 6–10 cm, scarcely puberulent; with serrate-incised margins; segments rhombic-ovate. Bracteoles sometimes present, paired small, lanceolate, 2–3 cm long. Pedicels 5–20 cm long, puberulent. Tepals (4–)5–7, ovate, with slightly narrowed apices and bases, pinkish-white, 6–15 × 5–10 mm, sparsely puberulent, basal veins 3–5, anastomosing vein absent (sometimes solitary). Stamens 3–5 mm long, with linear filaments, globose anthers and narrow connectives with small disjunctions. Carpels narrow-ovoid, asymmetric, compressed, glabrous, 1–2 mm long; styles conic, straight, apically uncinate, 2–3 mm long (Fig. 1m). Fruiting heads subglobise, ca. 1.5 × 1.5 cm. Achenes oblong-ovoid, basally shortly stalked, compressed, with lateral ribs 1–2 mm wide, 3–5 × 2–3 mm, glabrous; styles straight, but apically uncinate, 3–5 mm long, stigmas linear (Fig. 2o).

Chromosome number: unknown.

Pollen grains: 3-colpate (Huynh 1970a).

Distribution and habitat: South America. S. Chile, Brazil, Argentina; in tropical forests; alt. 1000–1800 m.

Specimens examined: **CHILE**. Andes, 3.1852, Poeppig 778 (K); Ad Scaturiginas Sichahne Cordiller de Rapos, 12.1854, Hohenaker 3059 (P); Buevir, San Lorenzo, 12.1873, Reed s. n. (K); Ando, 7.1896, Philippi (K); Polcahue, 16.1.1926, Comber 457 (E). **ARGENTINA**. Subrida Los Angeles, 7.2.1948, Dauzon 26004 (P); Prov. de Nequen, Serro Chapeleo, 1400 m, 12.2.1972, Cabrera 21911 (P).

Note: *Anemone antucensis* differs from other taxa of sect. Rivularidium by its shortly stalked achenes with distinct ribs, and it differs from the probably allied *A. moorei* by its smaller 3–5-parted or 3–5-lobed basal leaf blades, simple inflorescences with fewer flowers having smaller subglabrous tepals without anastomosing veins.

18. **Anemone tenuicaulis** (Cheeseman) Parkin & Sledge, Nat. 1 (1932)–*Ranunculus tenuicaulis* Cheeseman in Trans. N. Z. Inst. **17**: 235 (1885). **Type**: NEW ZEALAND. South Island, Auckland, South Alps, Mountains above Arthur's Pass, Canterbury, 4000–4500 ft., 1.1883, Lannary (lectotype–K!; isolectotype–E!).

Rhizomes vertical short nodulose, 4–5 mm in diameter, and horizontal long stolon-like, ca. 1 mm in diameter. Basal leaves 3–5; petioles basally vaginate, waved, 5–10 cm long, subglabrous; blades 3-sected, rhombic, 2–2.5 × 3–4 cm, subglabrous; segments sessile, 2–3-lobed. Scapes 15–20 cm long, solitary to few, sparsely puberulent; cymes 1-flowered. Bracts 3, sessile, reduced; blades 3-lobed, lanceolate, 1.5–2 × 1 cm, subglabrous. Pedicels 3–5(–8) cm long, sparsely puberulent. Tepals 5, linear-lanceolate, pinkish-red, 4–6 × ca. 2 mm, subglabrous, basal veins 1–3, anastomosing veins absent. Stamens 2–3 mm long, with dilated filaments, oblong anthers and wide connectives, with projections. Carpels oblong-ovoid, slightly compressed, glabrous, ca. 2 mm long; styles conic, hooked, ca. 1 mm long; stigmas sublinear. Fruiting heads subglobose, 12–15 mm long. Achenes spindle-like, compressed (ribs ca. 1 mm wide), 4–5 × ca. 2 mm, glabrous, gradually narrowed in conic uncinate styles ca. 1–2 mm long, stigmas linear (Fig. 2p).

Chromosome number: n = 7, 14 (Hair 1963, Ehrendorfer 1995).

Pollen grains: tricolpate (Huynh 1970b).

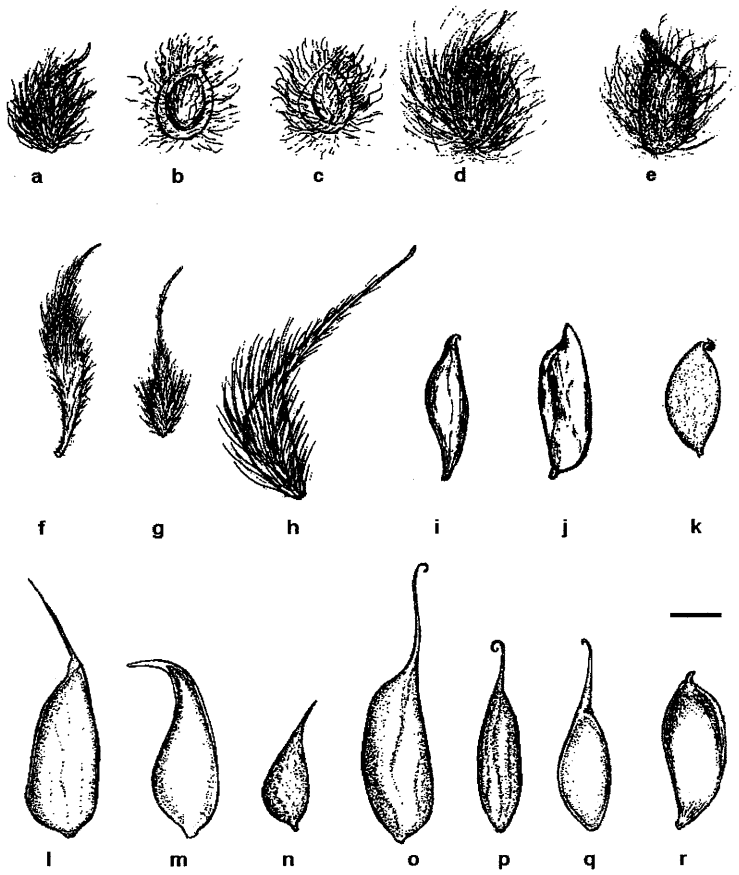

Fig. 2. Achenes of *Anemone* species from the Southern Hemisphere. a. *A. somaliensis* (Somalia. S. of Al Hills, 29.11.1929, Brown 413, K). b. *A. decapetala* (Argentina. Dep. Empedrado, Prov. Corientes, 22.8.1971, Pederson, K). c. *A. triternata* (Peru. Dept. Cusco, Santa Rosa, 13.2.1937, Stafford 516, K). d. *A. multifida* (Argentina. Estancia Harberton, Brown Chico, 7.1.1967, Goodall 468, MHA). e. *A. thomsonii* (E. Africa. Kilimandjaro, Geistensfluren, 12.1929, Wettstein, WU). f. *A. capensis* (South Africa. Cape Peninsula, 9.1980, Ecklon, WU). g. *A. caffra* (Plantes du Cap, Continuavit, Mac Owan, 11.1897, Glass, WU). h. *A. fanninii* (South Africa. Natal, Richmond, 25.3.1903, Medley 10083, P). i. *A. sumatrana* (Sumatra. Karinchi Peak, 2.4.1914, Closs, K). j. *A. helleborifolia* (Peru. Depto Lima, Prov. Canta, 7.3.1958, Ferreya 12965, P). k. *A. peruviana* (Peru. Anamantanya, 1834, Mathews 537, BM). l. *A. sellowii* (Brazil. Staat Rio de Janeiro, Itatiyana, 18.10.1927, Zerny, K). m. *A. assibrasiliana* (Lourteig, 1951). n. *A. moorei* (Chile. Prov. Talca, Altode Vieches, 30.1.1935, Espinosa 64658, P). o. *A. antucensis* (Chile. Andes, Buvier, San Lorenzo, 12.1873, Reed, P). p. *A. tenuicaulis* (New Zealand. Swampy Hill near Dunedni, 11.1932, Thomson, E). r. *A. crassifolia* (Tasmania. Cradle Mt., 19.3.1931, Sutton 1752, K). s. *A. hepaticifolia* (Chile. Valdivia, 1866, Lechler, P). Scale indicates 2 mm.

Distribution and habitat: New Zealand; in grasslands; alt. 1200–1800 m.

Specimens examined: **NEW ZEALAND**. Tararua Mts., near Nelson, 1931, Parkin (K); 9.1884, Kirk s. n. (K); Swampy Hill near Dunedni, 11.1932, Thomson s. n. (E); 9.1934, Suthie-Smith s. n. (K).

Note: *Anemone tenuicaulis* was described initially by Cheeseman (1885) as a *Ranunculus* species and afterwards was moved to *Anemone* sect. Rivularidium (Parkin and Sledge 1935). According to the literature (Parkin and Sledge 1935, Allan 1961) and our data, *A. tenuicaulis* is characterized by dimorphic rhizomes, short nodulose and long stolon-like, ternate basal leaf blades, 5–6 linear-lanceolate tepals only 4–6 mm long, and sessile oblong-ellipsoid achenes with styles 1–2 mm long. Within sect. Rivularidium it is the only species with the chromosome number of n = 7 and possibly it merits to be separated as a representative of a monotypic section.

19. **Anemone crassifolia** Hook. f., Icon. Pl. **3**: 257 (1840). **Type**: AUSTRALIA. Tasmania. Hempshire Hills, Black Bluff Mts., 4000 ft., 2.1837, Gunn 775 (lectotype–K!); loc. cit., 11.2.1845, Hooker s. n. (parat ype–K!).

Rhizomes vertical short, tuberous, 1–2 cm × 5–8 mm, and horizontal long stolon-like, 1–2 mm in diameter. Basal leaves 3–5; petioles basally vaginate, 3–5 cm long, puberulent; blades ternate, rhombic, coriaceous, 1.7–2.2 × 2.5–3 cm, sparsely puberulent only along margins; bases cordate; apices obtuse; margins entire; petiolules 2–5 mm long; leaflets 3–5-lobed, ovate. Scapes 5–8 cm long, subglabrous; cymes 1-flowered. Bracts 3; sessile; blades 3-lobed, ovate, 6–12 mm long, subglabrous. Pedicels 2–3 cm long, subglabrous. Tepals 6–7, elliptic, white, 12–17 × 6–8 mm, subglabrous, basal veins 3–5, anastomosing veins absent or solitary. Stamens 3–5 mm long, with filiform filaments, subglobose anthers and narrow connectives. Carpels ellipsoid, slightly compressed, ca. 2 mm long, scarcely covered with hairs 0.8–1 mm long only along lateral sides; styles curved, 1–2 mm long; stigmas linear (Fig. 1n). Fruiting heads subglobose, ca. 10 mm long. Achenes oblong-ellipsoid, slightly compressed, 4–4.2 × 1.8–2 mm, scarcely pubescent laterally; styles conic, slightly curved, ca. 3 mm long, stigmas linear (Fig. 2q).

Chromosome number: n = 7 (Huynh 1970), n = 8 (Schuettpelz et al. 2002).

Pollen grains: spiroaperturate (Huynh 1970b).

Distribution and habitat: Tasmania; on grassy slopes; alt. 1500–1800 m.

Specimens examined: **TASMANIA**. Cradle Mt., 19.3.1931, Sutton 1752 (K); Fingal Malahide, Mt.Read, 15 mi of Queenstown, 3660 ft., 5.1.1972, Lambert 801, 814 (K); Frenchmain's Cap, 4000 ft., 20.12.1960, McLagan s. n. (E).

Note: Plants of this species are characterized by dimorphic rhizomes (tuberous and stolon-like), basally slightly dilated basal leaf petioles and ternate blades, almost entire, coriaceous and subglabrous, scapes 5–8 cm long, solitary flowers, 6–7 white glabrous tepals 12–18 mm long without anastomosing veins, and achenes 2–3 mm long. As a result of our examination in the herbarium, we we confirm the expediency of the separation of *A. crassifolia* as a monotypic section (Tamura 1991).

20. **Anemone hepaticifolia** Hook. f., Icon. Pl. **1**: 1 (1836). **Type**: "Shady woods near the Bay of Valdivia, S. Chili", 1832, Bridges 570 (holotype–K!).

Rhizomes ascending, short, branched, 2–3 cm × 5–10 mm. Basal leaves 3–5; petioles basally sharply dilated, 10–30 cm long, pilose; blades 3–5-lobed, pentagonal, 7–10 × 10–15 cm, sparsely covered with long hairs; bases cordate; apices acuminate; margins coarsely serrate; lobes triangular. Scapes (15–)30–50 cm long, sparsely pubescent; cymes (1–)2–5-flowered, umbellifer-

ous. Bracts 3; sessile; blades 3–5-lobed (appearing pinnatifid), pentagonal, 3–5 × 2–3 cm, pubescent. Pedicels 3–7 cm long, sparsely pubescent. Tepals 5–7, elliptic, with narrow bases and wide apices, pinkish-white to bluish, sparsely pubescent basally and along veins, 10–35 × 5–15 mm, basal veins 3–5, anastomosing veins more than 10. Stamens 8–12 mm long, with filiform filaments, elliptic anthers and wide mucronate connectives with large subglobose projections. Carpels cylindroid, asymmetric, basally narrowed, 2–3 mm long, basally sparsely puberulent; styles curved, ca. 1 mm long; stigmas linear (Fig. 1o). Achene heads subglobose, ca. 10 mm long. Achenes cylindroid, basally narrowed, asymmetric, slightly compressed, smoothed, 4–5 × 2–3 mm, subglabrous; styles apically recurved, 1–2 mm long, stigmas linear (Fig. 2r).

Chromosome number: unknown.

Pollen grains: pantoporate (Huynh 1970a).

Distribution and habitat: S. Chile, Prov. Valdivia; in shady forests; alt. 300–500 m.

Specimens examined: **S. CHILE**. Prov. Morro Gonzales et Prov. Corral, 1851, Schlechtendal 556 (K); Cordillera del Costa, 1.1872, King s. n. (E); Corral, 1000 ft., 4.1884, Pearce s. n. (K).

Note: Hooker (1836) regarded this taxon as "very distinct and well-marked, called "Estrella" by the natives of Valdivia". By our data, plants of *A. hepaticifolia* are characterized by short monomorphic rhizomes, auriculate basal parts of basal leaf petioles, their 3–5-lobed blades having cordate base (like in *Hepatica* from the family Ranunculaceae). Their scapes mainly 30–50 cm long, inflorescences umbellate, tepals 5–7, whitish-pink, 15–25 mm long, with more than 10 anastomosing veins. The most characteristic peculiarities of this species are stamen shape (very large filaments and large connectives with very large semi-globose projections), and it is these characters that confirm the sectional status of *A. hepaticifolia*.

21. **Anemone rigida** Gay, Fl. Chil. **1**: 25 (1845). **Type**: N. CHILE. Esta especie se cria en los prados de las cordilleras de Talcaregue, prov. De Colchagua, a una altura de 6800 p, 1.1862, Reed (holotype–P!).

Rhizome ascending, short, branched, 4–6 mm in diameter. Basal leaves 2–3; petioles basally vaginate, 10–15 cm long, densely pubescent; blades 3–5-parted, coriaceous, rhombic-orbicular, 8–10 × 8–15 cm, sparsely pubescent; bases cordate; apices obtuse; margins incised-dentate; segments cuneate, lobate, lobules and teeth mucronulate. Scapes 25–60 cm long, sparsely pubescent; inflorescences trichotomously branched, 3–4-flowered. Bracts 3; petioles wide, 3–7 mm long; blades 3-parted or 3-lobed, rhombic, 6–10 × 8–12 cm, sparsely puberulent on both surfaces; bases cuneate; apices obtuse; margins lobulate-dentate; central segments 3-lobed; lateral segments 2-parted. Bracteoles paired, sessile, 3-lobed, narrow-rhombic, ca. 6 × 4 cm, sparsely puberulent. Pedicels 10–15 cm long, puberulous. Tepals (4–)5–6(–7), oblong-elliptic, with narrow bases and wide apices, white to bluish, 20–35 × 10–20 mm, glabrous, basal veins 5–7, anastomosing veins more than 10. Stamens 5–7 mm long, with slightly dilated filaments, subglobose anthers and narrow connectives. Carpels cylindroid, asymmetric, 3–4 mm long, basally covered with hairs ca. 1 mm long; styles straight, apically curved, 1–1.5 mm long; stigmas linear (Fig. 1p). Fruiting heads oblong-ovoid, ca. 10 mm long. Achenes ovoid, 4–5 × 2–3 mm, basally sparsely pubescent (hairs ca. 1 mm long) and basally covered with minute spinous projections, apically attenuate into hooked styles 1–2 mm long, stigmas linear.

Chromosome number: n = 8 or 24 (Ehrendorfer and Samuel 2001).

Pollen grains: pantocolpate (Huynh 1970a).

Distribution and habitat: South America. N. Chile; alt. 2000–2800 m.

Specimens examined: **N. Chile**. San Fernando, Philippi s. n. (K).

Note: The characteristic peculiarities of this species are basally gradually dilated basal leaf petioles and 3-parted coriaceous leaf blades, and almost similar involucral leaves, compound inflorescences, glabrous, white to bluish tepals 20–35 mm long and without anastomosing veins, slightly dilated filaments without projections, and glabrous ovoid achenes 4–5 mm long. The essential distinction of *A. rigida* from other *Anemone* taxa are its achenes, which are basally sparsely pubescent and covered with minute spinous projections.

Results

According to the results of our comparative-morphological analysis of *Anemone* taxa within the floras of the Southern Hemisphere, we recognize 21 *Anemone* species belonging to nine distinct sections. Our data confirm the specific state of *A. triternata*, *A. fanninii* and *A. peruviana* which were not accepted by most authors but we regard *A. poilanei* Gagnep. as a synonym of *A. sumatrana* de Vriese, *A. lanigera* Gay, *A. globosa* Nutt. ex Pritz. and *A. tetonensis* Port. ex Britt. as synonyms of *A. multifida*. According to the results of our study, *A. somaliense* has to be a member of section Anemone as a monotypic subsect. Somalienses, subsect. nov. Besides, our data confirm the morphological segregation at the sectional level of A. *thomsonii*, *A. caffra* and *A. fanninii*, *A. angustiloba and A. sumatrana*, but also of *A. crassifolia*, *A. hepaticifolia*, and *A. rigida*. For the ten *Anemone* species belonging to sect. Rivularidium we described two series, Angustiloba and Jamesonii, and we accept ser. Mexicanae, albeit in another sense than Starodubtsev (1989).

We used for our comparative morphological analysis some additional characters and we regard most of them as essential ones. Nine species from five sections (*A. multifida, A. capensis, A. caffra, A. fanninii, A. angustiloba, A. sumatrana, A. helleborifolia, A. peruviana* and *A. rigida*) have plesiomorphic caudices and tap-roots, and four species (*A. multifida, A. thomsonni, A. angustiloba* and *A. sumatrana*) have axillary cymes (monopodial above-ground shoots are a plesiomorphic character, too). Within essential additional characters there are auriculate basal parts of basal leaf petioles (possibly former stipules in *A. thomsonii, A. sumatrana, A. helleborifolia, A. peruviana, A. jamesonii, A. sellowii, A. assibrasiliana* and *A. hepaticifolia*), dimorphic tepals (*A. capensis, A. fanninii, A. sellowii* and *A. assibrasiliana*), persistent tepals (A. *triternata* and *A. multifida*), distinct anther projections (A. *assibrasiliana* and *A. hepaticifolia*), shortly stalked carpels and achenes (A. *thomsonii* and *A. antucensis*), shape of stigmas (viz., subcapitate in *A. thomsonii*) and shape of filaments (filiform or dilated) and anthers (narrow or wide connectives, sometimes with distinct projections). We also use shape, size and villosity of leaves, tepals, carpels and achene morphology including achene styles for delimitation of taxa.

Within the southern *Anemone* species, only the taxa of sect. Rivularidium are distributed mainly in the Southern Hemisphere, and most species of sections Anemone and Eriocephalus are distributed in the Northern Hemisphere (both Eurasia and North America). Within floras of the Southern Hemisphere, there are three species of section Anemone (*A. somalienis, A. decapetala* and *A. triternata*) and only are species of section Eriocephalus (*A. multifida)* with a very disjunctive distribution through mountains of North and South America.

The most significant phenomenon is the presence within the floras of the Southern

Hemisphere of seven *Anemone* species which represent mainly the monotypic endemic sections Hepaticifolia and Rigida (South America), Crassifolia (Tasmania), Kilimandscharica, Pulsatilloides and Alchimillifolia (Africa).

Within *Anemone* species in the floras of the Southern Hemisphere, forest plants predominate. Many of them grow in high mountains only, therefore, these plants are extratropical and most of them differ slightly from usual "northern" *Anemone* species. Two species (*A. decapetala* and *A. multifida*) have very wide altitude limits (100–3700 m) and both of them are components of the floras of both North and South America. Meanwhile, four species (*A. thomsonii* (S. Africa), *A. jamesonii* and *A. peruviana* (S. America) and *A. angustiloba* (SE. Asia) are ultra-oreophytes, growing at 2500–4500 m elevation. In fact only five species, *A. somaliensis*, *A. capensis*, *A. antucensis*, *A. assibrasiliana* and *A. moorei*, can be regarded as real tropical plants, being distributed at 300–1200(–1800) m.

Comparison of the results of the morphological and molecular analyses

According to the results of DNA study (Hoot et al. 1994), *A. multifida* is allied to other taxa of sect. Eriocephalus, South American *A. assibrasiliana, A. sellowii, A. antucensis* and *A. rigida* belonging to mainly South African sect. Pulsatilloides (not sect. Rivularidium like believed other authors). They placed Tasmanian *A. crassifolia* close to S. African *A. caffra*, and African *A. thomsonii* close to E. Asian *A. hupehensis* from sect. Eriocapitella. Meanwhile, these authors regarded the position of E. Asian *A. sumatrana* as uncertain.

A little later Ehrendorfer (1995) regarded *A. sumatrana* as a member of sect. Rivularidium, and he included several southern groups (S. American *A. sellowii, A. helleborifolia, A. antucensis, A. hepaticifolia* and *A. rigida*, New Zealand's *A. tenuicaulis* and Tasmanian *A. crassifolia*) into subgenus (section) Meridium sensu Starodubtsev (1989). In this paper Ehrendorfer united the South African *A. capensis*, *A. caffra* and *A. thomsonii* into the Pulsatilloides group.

Later Ehrendorfer and Samuel (2001) regarded *A. antucensis* and *A. tenuicaulis* as a sister subgroup, and afterwards all these authors (Schuettpelz et al. 2002) supposed that *A. caffra* and *A. crassifolia* belong to the one monophyletic subgroup and *A. antucensis* and *A. tenuicaulis* to another one.

According to the results of our morphological study, *A. crassifolia, A. hepaticifolia* and *A. rigida* differ from other southern species of sect. Rivularidium mainly by carpels and achenes (cylindroid, slightly compressed, having paired lateral ribs less than 1 mm wide, basally sparsely pubescent, and with hooked styles 1–2 mm long). Within them, *A. crassifolia* has rare tuberous and stolon-like rhizomes, and much smaller size of leaves, scapes, flowers and achenes, *A. hepaticifolia* has the very distict large anther projections, and *A. rigida*–basally pubescent achenes covered with minute spinous projections.

Our results confirm the opinion of Ehrendorfer and Samuel (2001) about the morphological characters of a provisional *Anemone* ancestor. We agree with them that these plants had to be "perennial herbs, growing in warm-temperate forests, with rootstock (tap-roots), tall and branched stems, compound basal, cauline and hardly differentiated opposite involucral leaves, many-flowered inflorescences, flowers with sepals (tepals), glabrous fruitlets (achenes) with long beak, tricolpate pollen and the basic chromosome number of x = 8" (Ehrendorfer and Samuel 2001; p. 299). We have to add to this description branched caudices, auriculate basal parts of basal leaf blades, petiolate bracts, monopodial scapes, dimorphic perianth with numerous anastomosing

veins, and stalked carpels and achenes. Finally the presence within southern *Anemone* species of number taxa having plesiomorphic morphologic characters and being allied on DNA analysis data (despite of their belonging to different generally accepted infrageneric *Anemone* groups) reflects their possible significant role in the further differentiation and world-wide dispersal throughout the both Hemispheres into the most diverse habitats.

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S. N. ジーマン[a], C. S. キーナー[b], 門田裕一[c], E. ブラーク[a], O. N. ツァレンコ[a]：**南半球産イチリンソウ属（キンポウゲ科）の分類学的再検討**

標本調査の結果にもとづき，南半球に分布するキンポウゲ科イチリンソウ属の分類学的再検討を行った結果，9節21種を認めた．イチリンソウ節 sect. Anemone に1新亜節 subsect. Somalienses Ziman, Bulakh & Kadota, Rivularidium 節に ser. Angustilobae Ziman, Bulakh & Kadota と ser. Jamesonii Ziman, Bulakh & Kadota の2新列と ser. Mexicanae (Starodub.) Ziman, Bulakh & Kadota, の1新組み合わせを記載した．認められた21種について詳しく記載し，それらの花部器官や痩果を図示した．このうち *A. triternata* Vahl, *A. fanninii* Harvey, *A. peruviana* Britton の3種はその存在がこれまで無視されてきたものである．

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